



FRIDAY, AUGUST 12.

## NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

**New Companies Organized.**—Hawkinsville & Western incorporated in Georgia.—Kansas City, Rich Hill & Southern incorporated in Missouri.—Louisville & Jeffersonville Bridge Co. organized in Indiana.—Mormon & State Line files articles in Illinois.—Neversink incorporated in Pennsylvania.—New York & Long Island incorporated in New York.—Paducah & Tennessee incorporated in Kentucky.—Sedan & Moline incorporated in Kansas.—Tennessee, Carolina & Georgia incorporated in Georgia.

**Elections.**—Chautauqua Lake, R. N. Marvin President.—Cincinnati, Hamilton & Dayton, A. V. Winslow President.—Florida Railroad Commission, Messrs. McWhorter, Vann and Himes.—Louisville & Jeffersonville Bridge Co., Dennis Long President.—Louisville, New Albany & Chicago, R. M. Arnold General Freight Agent.—Mississippi Valley Freight Traffic Association, J. J. Rogers Chairman.—Missouri Pacific, W. H. Newman Third Vice-President.—New Haven & Derby, Wm. H. Stevens President.—Omaha & Yankton, H. N. Shepard President.—St. Louis, Keokuk & Northwestern, W. W. Baldwin Receiver.—Tennessee Midland, A. S. Buford President.

**Personal.**—Died. Thomas T. Wierman, Horace Abbott. **Leases and Sales.**—Parsons & Pacific sold to Kansas City and Pacific.—Rochester & Ontario Belt sold.

**Changes and Extensions.**—Alabama: East & West extended from Broken Arrow to Pell City, Ala.—Iowa: St. Louis, Keokuk & Northwestern placed in charge of receivers.—Illinois: St. Louis & Chicago completed from Litchfield to Mount Olive, and work begun north of Springfield.—Kansas: Chicago, Rock Island & Pacific's southwestern line reaches Wellington, Kan.—Kentucky: Louisville, St. Louis & Texas graded for 47 miles.—Minnesota: Duluth & Iron range surveys new branch.—New Brunswick: Caraquet road completed to Poquemanche.—New Hampshire: Work begun on Upper Coos.—Pennsylvania: Baltimore & Ohio Short Line and the Wheeling, Pittsburgh & Baltimore consolidated. Cornwall & Lebanon will build a branch to New Holland. South Pennsylvania operations postponed.—Wisconsin: Chicago, Milwaukee & St. Paul nearly completed to New Glarus. Work on Freeport, Dodgeville & Northern to begin at once. Milwaukee, Lake Shore & Western surveys a shorter route to Ashland.

**Traffic.**—Cotton receipts, interior markets, for week ending Aug. 5 show a decrease of 46 per cent., as compared with last year; shipments show a decrease of 64 per cent.; seaboard receipts a decrease of 80 per cent., and exports a decrease of 20 per cent. Cotton in sight is less than at the same date last year by 16 per cent.—Anthracite coal shipments for the week ending Aug. 6 show increase of 3 per cent. over last year; bituminous shows decrease of 12 per cent.; coke for week ending July 30 shows decrease of 36 per cent.

**Miscellaneous.**—Meiss elevated road to be begun next month.—Louisville & Nashville locates shops at Decatur, Ala.—Burton Stock Car Co. to build shops at Wichita, Kan.—New York & Boston Rapid Transit making surveys.—Rains in the parched region west of Chicago.

## Contributions.

## Driving Piles.

RICHMOND, Va., Aug. 6, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In answer to an inquiry by one of your correspondents in your issue of Aug. 5, the following data are given: Experiment in 1871, tidal stream, water 6 ft. deep, soft mud more than 80 ft. in depth, into which piles were sunk some 45 ft. Nineteen hours after driving the dead weight required to start the pile was about 13,000 lbs. A pile 40 ft. long sank with its own weight and hammer of 2,000 lbs., 30 ft. By a blow of 2 ft. fall, it sank 6½ in. further in a minute and stopped. Four weeks after it resisted the impact of the hammer falling 5 ft., and a blow of 14 ft. sent it down 4½ in.

The weight imposed upon the piles in service is about 6,500 lbs. They form the supports of a long trestle, and have never settled.

E. T. D. MYERS.

## Furnace Cinder for Ballast.

PHILADELPHIA &amp; READING RAILROAD CO., PHILADELPHIA, Aug. 3, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In answer to your inquiry of the 2d inst., asking for information bearing on the cost and value of cinder ballast, would state that this company has used cinder ballast for the past six years to some extent, and find that while it is not quite as lasting as stone, it gives very good results. I cannot agree with the English method of cooling by cold water. Our experience shows that water injures the slag—makes it brittle and unfit for ballast. At the Reading Iron Works, at Reading, Pa., this company erected a crusher. The slag was run into troughs direct from the bosh, then broken by picks and hauled by small cars and mule 200 ft., up a grade of 5 ft. per 100 ft., to the crusher. The cost to put it into railroad

cars was 30 cents per cubic yard. To deliver on track, average haul 20 miles, cost 22 cents per cubic yard, and 10 cents per cubic yard to put it in place, making total cost in place 62 cents, or \$1,090 per mile of single track, with depth of ballast of 12 in., and width of 9 ft.

At Meiley's Furnaces, at Lebanon, Pa., the slag was hauled from the bosh by iron cars to points along the siding at the furnace, when it was dumped into pits 150 ft. long by 10 ft. wide, with an average depth of 6 ft. The slag would run in layers of about 1½ in. and each layer be cooled by the time a second deposit was made. By this method the slag, when cold, was readily worked up by bars and picks, requiring no preparation and making a very fair ballast, costing in the track 56 cents per cubic yard. For such slag ballast purchased from contractors the cost in cars was 45 cents per cubic yard, making the cost in track 77 cents per cubic yard, or \$1,355.20 per mile.

In conclusion, I would advise that the slag be allowed to cool naturally, the less water used the better.

H. K. NICHOLS, Chief Engineer.

[See letter from C. C. C. in the Railroad Gazette, July 8, 1887.—ED.]

## Accident Record—Correction.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Under the head of "Accidents for the month of June," I note that you report the derailment of a passenger car near Durham, N. C., on the night of June 10. No such accident occurred; in fact, there was no derailment of a passenger car at or near Durham during the month of June.

W. H. GREEN, Superintendent.

## A Last Word from "A."

NEWTON, Iowa, August 1, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Without desiring to lengthen a "discussion inconclusive or profitless," I would still like to correct some impressions carried with your editorial article of the 22d inst.

A admitted in express terms that a locality could sometimes be justly deprived of a "trade advantage that proximity gives."

He is willing, also, to admit, if the Gazette please, that a railroad can sometimes base its charges (for transportation) on considerations other than cost.

He wishes, however, that basis of cost should be fundamental rather than what is involved in that "expression of unfortunately brutal sound," and does not care whether variation is as square as square root, or in arithmetical progression.

He can hardly "look back to the simpler and quieter life of 100 years ago," but the last third of that time has afforded him an opportunity to witness something of "development" and its effects, and whether the earlier part has or has not been "more congenial to the growth of patriotism and piety," the whole has not been entirely unfavorable for reflection, and he hopes he has profited by its growth.

He thinks the Gazette has not been fortunate in the comparison of freights on silk and hay; that on the latter sometimes amounting to prohibition of shipment, and not a small part of the charges on the former being due to something besides transportation.

He remembers when \$1,000 was charged on a locomotive from St. Joe, Mo., to Omaha, part of which amount was for transportation, and balance claimed for insurance. As this transportation was by water, he wonders whether a committee of eminent citizens will wait upon the Commission praying that the Inter-state Commerce law be annulled in their favor on account of competition of the Missouri River.

The Inter-state Commerce law does not necessarily legalize all the abuses it is powerless to correct. If corn is hauled from Wichita to Chicago, 800 miles, for the same price it is hauled from Peoria to Chicago, 80 miles, it would seem to be a case warranting complaint to, and investigation by the Commission.

As to "discriminations against localities, individuals and industries," A has found while "going on with his studies," that they have grown less frequent since April 5, and doubtless the Inter-state law has had something to do with having "men become more enlightened." It was notorious that previous to the law going into effect flagrant discriminations against individuals were common in even our small towns. Of parties in the same line of business, one was paying published schedule rates, and another received a rebate, simply because he was sharp enough to demand it. Possibly the Gazette is sometimes over-scrupulous about getting information only from official sources.

It would seem by the published testimony of officials and others interested in the paying or not paying the debts of the first transcontinental railroad as if they had a grievance in connection with loss of rights in geographical position. They seem to deny the right of government subsidizing other roads in competition with them. Although not a believer in their right to complain, I have long thought some tribunal should be created whose duty should be to decide beforehand whether a proposed railroad construction is warranted by the needs and interests of the public. I could point out many instances where valuable territory was occupied by adventurers or subsidy grabbers, who had no just ideas of a railroad to be operated partially in the interest of the public. They built for subsidies, with characteristics too poor for profitable operation. Reputable railroad operators were kept out to the injury of the community, or finally bought what had to be rebuilt, practically paying blackmail to the original projectors, who possibly had gained what they

deemed an enviable reputation as pioneers in the development of the resources of the country.

[And now, if A. pleases, we will all take a little time to reflect upon some of the fundamental notions which his letters have brought forward.—EDITOR RAILROAD GAZETTE.]

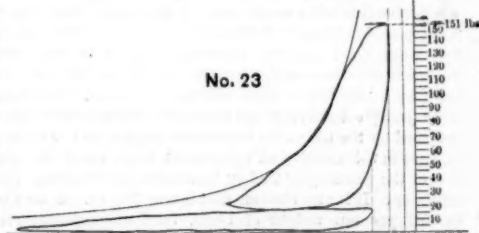
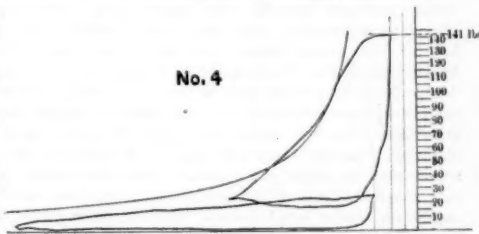
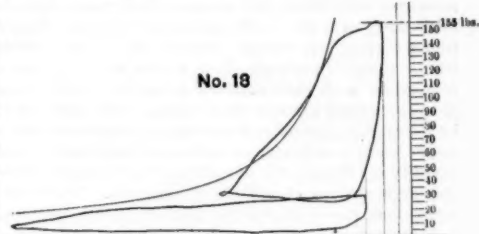
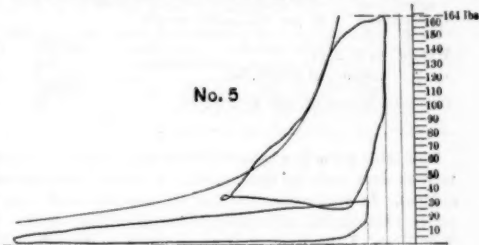
## Performance of a Compound Locomotive.

The diagrams shown in the accompanying illustrations were taken from the "Dreadnought," one of Mr. Webb's compound express engines, while running a special train on the London & Northwestern main line between Crewe and Wolverton, a distance of 105 miles. The average speed, including stops every 15 miles, was 24 miles per hour. The average speed while in motion was 25.7 miles per hour. The length of the train was 813 ft., and the weight was as follows:

	Lbs.	Tons.	Cwt.
25 vehicles including dynamometer car.....	580,580	259	4
Engine and tender.....	140,336	62	13

Total.....720,916 321 17  
The coal put into the fire-box during the journey of 105 miles was 2,688 lbs., giving a consumption of 25.6 lbs. per mile. The amount of water used was 2,629 imperial gallons, equal to 3,145½ American gallons. The evaporation of water (including that lost by overflow at the injectors and by leakage) was 977 lbs. per lb. coal.

The amount of coal used in raising steam was 560 lbs. and



INDICATOR DIAGRAMS.

COMPOUND LOCOMOTIVE "DREADNOUGHT," WEBB'S SYSTEM, London &amp; Northwestern Railway.

about 1,120 lbs. was in the firebox, on arrival at Wolverton, and after giving up the train, the engine ran on to Bletchley, 5½ miles, without any additional fuel being put on the fire, so that the amount of coal actually consumed in running the train was only about 2,650 lbs., or 23.25 lbs. per mile. Reckoning the coal remaining in the firebox as being half burnt, it was equivalent to the coal used in raising steam, and therefore the consumption per mile, 25.6 lbs., may be reckoned to include the coal used in raising steam and light running.

During the trip 26 diagrams were taken, all on ascending gradients or on the level. The diagrams selected for illustration were taken under the circumstances given below:

TABLE I.

PARTICULARS OF DIAGRAMS COMPOUND LOCOMOTIVE "DREADNOUGHT," APRIL 17, 1887.

No. of diagram.....	4	5	18	23
Where taken.....	Betley.	Madeley.	Nuneaton.	Rugby.
Grade, ft. per mile.....	30	30	16	14.5
Speed, miles per hour.....	20	20	24	21
Boiler pressure, lbs.....	165	178	175	170
Initial.....	141	164	153	151
Gear, high pressure.....	3	2.5	3	3.25
back of reversing (turns screw).....				
Gear, low pressure.....	Full.	Full.	Full.	Full.
Mean pressure, h. p. lbs.....	56.7	65.8	63.8	50.9
Mean pressure, l. p. lbs.....	15.0	17.0	17.1	11.2
Gross tractive force, lbs.....	56.75	65.40	67.40	47.75
Resistance per gross ton of train, deducting effect of grade.....	5.0	7.7		
Indicated horse power.....	303	349	440	267



The grade on which diagrams 4 and 5 were taken was ascended at an even speed and therefore it is possible to make an attempt to ascertain the frictional resistance of the train.

It appears that the tractive power shown in diagram No. 4 was not sufficient to prevent the train losing speed and therefore the reverse screw was advanced half a turn increasing the gross tractive force nearly 900 lbs. The actual frictional resistance appears to have been about 7 lbs. per ton.

The engine employed was the "Dreadnaught" No. 503.\* The two high pressure cylinders outside connected are 14 in. dia. by 24 in. stroke, while the single low pressure cylinder is 30 in. dia. by 24 in. stroke.

The following table gives a comparison between her performance and that of other fast passenger engines:

CONSUMPTION OF FUEL, FAST PASSENGER LOCOMOTIVES.

Railroad.	Philadelphia & Reading.	London & North Western.	Central New Jersey.	Great Northern (England.)	New York, Lake Erie & Western.
Fuel.	Anthracite.	Semi-anthracite.	Anthracite.	Bituminous.	Anthracite.
References to fuller particulars.	R. R. G., April 18, 1884.	Present issue.	Recent Locomotives, 2d edition, pp. 77-80.	R. R. G., April 1, 1887.	
Length of run, miles.	119	105	129	139	
Speed including stoppages, miles.	12 3/4	24	45.3	43.0	39.3
Average speed while in motion, miles.	7 3/4	25.7	50.0	46.5	41.5
" distance apart stops, miles.	7 3/4	15	10	36	10.7
Consumption coal per mile including lighting up.	37.1	56.5	25.0	51	70
Consumption coal per ton gross weight.	3.3	5.0	1.27	2.54	2.05
E. T. & T., oz.	402,000	730,918	370,000	437,000	426,180
Weight E. T. & T., Gross tons.	179.0	321.17	165.0	195.0	190.5
" engine and tender, lbs.	150,000	140,336		142,000	183,292
" train, lbs.	252,000	580,580		295,000	242,888
Lbs. train hauled by 1 lb. E. T., lbs.	1.68	4.14		2.07	1.33

This table gives in a collected form nearly all the available modern data as to the consumption of coal on fast passenger engines. It will be observed that all the American engines on the Philadelphia & Reading, Central of New Jersey and New York, Lake Erie & Western burn anthracite. It is somewhat unfortunate that no exact observations have been made lately as to the consumption of a modern American engine burning soft coal and running an express passenger train. It would probably show results more favorable in comparison with those obtained on the two English engines. It has been often urged in these columns that soft coal can be by the exercise of some skill and care, be burned on fast passenger trains so as to give no smoke and dust, while a smaller quantity of bituminous coal would do the work now done by the large amount of anthracite consumed. It will be observed that, comparing the two English engines, the London & Northwestern compound ran at a higher speed than the Great Northern simple, and made very much more frequent stoppages, and that the consumption per ton of the gross weight of the train was slightly heavier, but as the cars in one train weighed almost exactly double the weight of the cars in the other train, the consumption per ton weight of car was almost exactly equal, notwithstanding the higher speed and the more frequent stoppages with the compound engine. It will also be observed that the weight of the latter engine and tender was only a fourth of that of the cars, while in the other cases the engine and tender weighed more than half the weight of the cars. This is partly due to two causes—the London & Northwestern engine has a single pair of radiating wheels in the front end of the engine, while all the other engines have a four wheel truck, and the tender is fitted with the Ramsbottom water scoop, and, therefore, is lighter than an ordinary tender holding a larger quantity of water. The figures show pretty conclusively the enormous economy that can be obtained by the use of the compound engine, and will be of interest in this country at the present time, when the question of the economy of fuel on locomotives is receiving more attention. It is also obvious that where 2 1/2 oz. of coal are burned per ton weight of train, that the nuisance from sparks and smoke must be considerably less than where from 6 to 7 oz. are burned per ton per mile, and an economical passenger engine not only means a saving in the coal bill, but a considerable abatement of the nuisance from sparks and dirt and a consequent augmentation of the passenger traffic.

The figures as to consumption on the Philadelphia & Reading, London & North Western, and Central of New Jersey were ascertained on a single day's work. The figures as to the Great Northern consumption are founded on the average of several years running with all the engines of that class, single 8 ft. drivers, 18 x 28 cylinders outside, connected with four wheel truck and pair trailing wheels. The figures as to the consumption on the Erie show the actual results obtained with a passenger Mogul with Wootten fire box, running regularly with express trains between Susquehanna and Hornellsville.

In all cases the grades are fairly good, those on the Great Northern being the most severe, but only 30 and 26 ft. per mile. The London & Northwestern grades are lighter and the level and stright alignment of the Bound Brook route is well known. The line grades do not exceed 14 ft. per mile but the curves are more numerous than on the other lines.

#### The Robbins Automatic Ground for Telegraph Circuits.

Probably four-fifths of the operators on railroads in this country have other than telegraph duties to perform, such as those of ticket agent, freight clerk, book-keeper or station agent at some small yet important telegraph station. All these functions tend to distract the operator's attention from

the telegraph unless he is called or desires to use the circuit himself.

It was with the object of removing these difficulties that Mr. A. C. Robbins, electrician of the Robins Electric Signal & Telephone Association, of this city, designed the telegraph circuit shown in the accompanying illustration. The improvement made by Mr. Robbins consists in employing a constantly flowing normal current and increasing the same when it is desired to make a signal. This latter is accomplished by shunting the resistance *W*. His principal object, however, in addition to this, is to prevent the disabling of the line which would ordinarily be caused by a break or ground, and this is accomplished by employing an automatic ground by which the circuit is automatically completed at the last accessible station when a break occurs. By the placing of a galvanometer on the circuit the position of the break or ground can be very closely located.

In the illustration the circuit is shown as applied to such a system, in which *H H'* are terminal stations and 1, 2 and 3

*C*<sup>2</sup>, and permitting of full communication between the terminal stations. By means of this system the failure of operators to close their keys, or to place the line to earth, in order that they may be communicated with when interruption occurs, causes no interruption of communication, so that train dispatchers and other railway officials can always command the movement of trains.—*Electrical World*.

#### The Maps of the U. S. Geological Survey.

The economic benefits of the work performed by the U. S. Geological Survey are just beginning to be appreciated by railroad men who are laying out new lines of railroad. The officials of the survey are of the opinion that within the next ten years the centre of all the railroad building in the country will be located in the Southern States. They base this opinion on the fact that the calls for maps of the Southern mountain ranges is increasing very rapidly. The maps thus far prepared by the Geological Survey cover the eastern coast line from the Maryland boundary to the Georgia coast, with the exception of a small section of Virginia. They are at present issued only to those directly interested in the topography of the Appalachian range, yet there have been issued already upward of three thousand five hundred maps of the region; that is to say, about a hundred different sets. These maps have all been distributed to those directly interested in the building of new railroads. It is said that there are somewhere about twenty different roads in course of construction between the coal fields of the South and the seaboard or the Ohio River. One gentleman, who is interested in the construction of a road between Charleston, S. C., and the mouth of the Big Sandy on the Ohio, called at the office of the Survey a day or two ago and said that the maps which had been furnished to his company had saved the corporation at least ten thousand dollars in preliminary surveys. From all sections of the South, reports are constantly received of the enormous value of the maps furnished by the Survey to topographical and civil engineers. Beside the work which has been done in the Southern States, the survey has been extended well into many sections of the North and West. Massachusetts has been mapped on a scale of a square mile to the inch through the joint work of the state and the general government. A field party has just begun operation in southeastern Iowa for the purpose of mapping that state on a similar scale. Illinois and Indiana will, in all probability, be the next states in which the surveys will be undertaken. There is a great difference in the cost of the work in the various States. In the South, where the country is broken by mountain ranges, the cost is about twelve dollars a square mile; while in the prairie states of the West, where the country is flat, the work can be performed at about five dollars a square mile. It is the ultimate intention of the bureau to prepare topographic maps of the entire country. Owing, however, to the necessary slowness of the operations, it will be many years before the entire scheme of operations is perfected. As fast as the field-operations in each case are perfected and verified, the original maps are sent to the engraver, and a few copies are made for immediate use. Eventually there will be prepared an atlas of each state. These atlases will be of enormous value, not only to railroad engineers but to all municipalities who have use for an accurate topographic map of the country surrounding them.—*Science*.

#### Continuous Brakes in Europe.

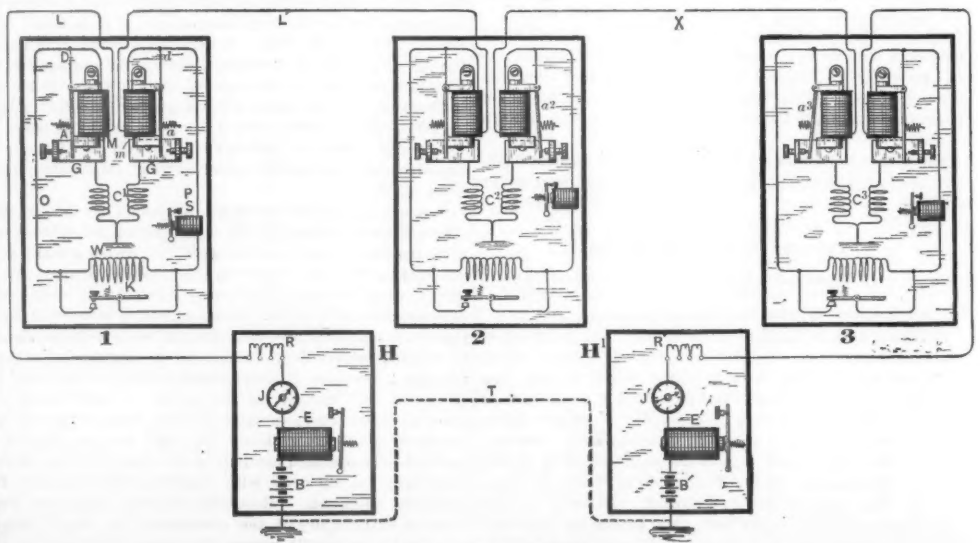
The application of continuous brakes on passenger trains in Europe has been carefully considered by the International Railroad Congress, and is summed up in their *Bulletin* as follows:

In France the Westinghouse automatic has been generally adopted by the Paris, Lyons & Mediterranean Co. The Eastern, the Western, the Southern, and the Orleans companies have also applied it on a large part of their stock, but they use also the automatic brake of Wenger which has been adopted by the state roads.

The Northern has equipped its stock with the Smith-Hardy vacuum brake, which is also used on certain trains of the Eastern, which have a service in common with the Northern. This brake is not automatic, and the Northern is the only French company which has rejected the automatic principle. The table below sums up from official documents the number of locomotives and cars equipped now or shortly to be equipped with continuous brakes.

In Belgium, the State Railroad has completed the equipment of all its passenger stock, and now has 582 locomotives, 37 steam carriages and 3,973 passenger cars equipped with the Westinghouse automatic brake, besides 398 vehicles of various classes provided with continuous train pipes. The Grand Central of Belgium has placed the automatic vacuum on 7 locomotives and 45 carriages.

In Italy, the Southern Railroad has the Smith-Hardy on 90 locomotives and 470 cars. The Mediterranean has the



ROBBINS' AUTOMATIC GROUND SYSTEM.

\* This engine is illustrated in *Recent Locomotives*, figs. 500 to 505.

## CONTINUOUS BRAKES IN FRANCE.

NAME OF COMPANY.	System.	April 1, 1887.		April 1, 1888.	
		Locomotives.	Cars.	Locomotives.	Cars.
French State.....	Wenger automatic.....	272	2,702	558	3,432
Eastern.....	Westinghouse automatic.....	359	2,173	.....	.....
Western.....	.....	560	3,880	.....	.....
P., L. & W.....	Westinghouse automatic with 2 train pipes for varying pressure.....	495	5,113	710	7,302
Southern.....	Westinghouse automatic.....	59	810	59	810
Orleans.....	Wenger automatic.....	288	820	235	1,290
Northern.....	Westinghouse automatic.....	228	1,432	.....	.....
.....	Smith-Hardy non-automatic.....	784	3,873	.....	.....

Westinghouse automatic on 118 locomotives and 406 cars; the double pipe system (for graduating brake power) of the Paris, Lyons & Mediterranean, on 31 locomotives and 41 cars, the Smith-Hardy on 47 locomotives and 409 cars. These latter are used on account of the interchange with the Gothard route and the Adriatic system.

The commission also sums up the application of continuous brakes in England as follows: Eighty-nine per cent. of the locomotives and 83 per cent. of the passenger cars of the United Kingdom are provided with continuous brakes. Eight years ago these figures were 13 and 19 per cent. June 30, 1886, the equipment was: Westinghouse automatic, 1,706 locomotives, 14,519 cars; automatic vacuum, 2,185 locomotives, 11,714 cars; Smith vacuum, 1,250 locomotives, 7,773 cars; vacuum, 657 locomotives, 4,548 cars, and various other types used in less number.

The Northern of France has expended 6,380,000 francs on

continuous brake equipment. The Paris, Lyons & Mediterranean has already expended 6,500,000 francs, and within a year will have expended over 9,000,000. The expenditure of the Orleans is 3,542,000 and the Southern 791,000, to which will soon be added 1,886,000 francs for the Wenger. The Western of France has laid out more than 5,000,000 francs, the Belgian State 4,180,000, and the Mediterranean system in Italy 1,356,000.

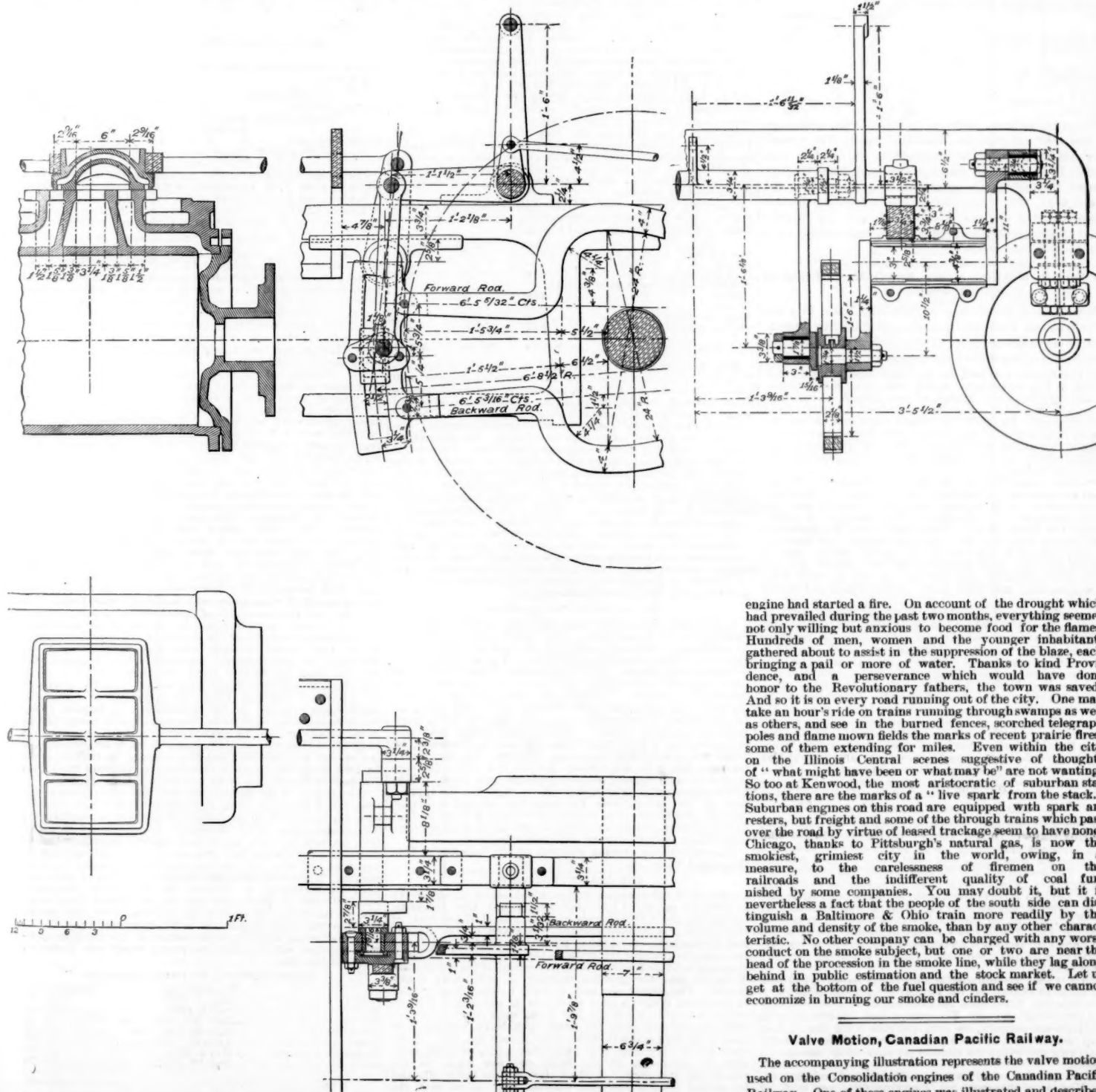
It was the intention of the Commission to show the price of equipment with the different systems, but the figures received were so discordant that no reliable comparison could be made.

All of the companies express themselves satisfied with the brake systems which they are using, and report failures as extremely rare, the most frequent being from bursting of couplings, and most of the companies have sought to obviate this evil by the use of metallic couplings. Experiments, how-

ever, in this direction have, up to the present time, given unsatisfactory results. The Eastern, of France, from experiments begun in May, 1885, on various systems of metallic couplings, reported its conclusions as follows: "The results up to the present have not been at all satisfactory, and experiments lead us to fear that it will be impossible to devise a metallic coupling which shall be strong, simple and easily maintained; therefore, we have sought in other directions to diminish the number of ruptured couplings. Having observed with the greatest possible exactitude the law by which ruptures took place according to the duration of service, it was shown that more than 90 per cent. of the coupling pipes which burst had been in service over 18 months. It has been resolved, therefore, to allow no coupling to remain longer than that time. This practice has been in force since August, 1886, and has produced the best results, failures of this sort having decreased steadily since that time. The failures recorded were, in July, 1886, 85; September, 21; October, 15; November, 7; December, 8; January, 1887, 4; February, 5." The company finds that the expense is not serious as the total sacrifice is only the few last months of the life of the coupling, and there has not yet been devised a metallic coupling in which the interest account and cost of maintenance does not exceed that of replacing the flexible couplings for 18 months.

## Fires from Locomotives.

A Chicago correspondent writes: It was quite a relief to me to read the editorial in the *Railroad Gazette*, July 22, on fires caused by carelessness on the part of engineers and firemen. I happen to be a property owner in one of Chicago's most attractive suburbs, Washington Heights. The village is located on the lines of the Pan Handle and Rock Island roads. On Sunday, July 17, a luckless spark from a Pan Handle



VALVE MOTION, CANADIAN PACIFIC RAILWAY.

engine had started a fire. On account of the drought which had prevailed during the past two months, everything seemed not only willing but anxious to become food for the flames. Hundreds of men, women and the younger inhabitants gathered about to assist in the suppression of the blaze, each bringing a pail or more of water. Thanks to kind Providence, and a perseverance which would have done honor to the Revolutionary fathers, the town was saved. And so it is on every road running out of the city. One may take an hour's ride on trains running through swamps as well as others, and see in the burned fences, scorched telegraph poles and flame mown fields the marks of recent prairie fires, some of them extending for miles. Even within the city on the Illinois Central scenes suggestive of thoughts of "what might have been or what may be" are not wanting. So too at Kenwood, the most aristocratic of suburban stations, there are the marks of a "live spark from the stack." Suburban engines on this road are equipped with spark arresters, but freight and some of the through trains which pass over the road by virtue of leased trackage seem to have none. Chicago, thanks to Pittsburgh's natural gas, is now the smokiest, grimmest city in the world, owing, in a measure, to the carelessness of firemen on the railroads and the indifferent quality of coal furnished by some companies. You may doubt it, but it is nevertheless a fact that the people of the south side can distinguish a Baltimore & Ohio train more readily by the volume and density of the smoke, than by any other characteristic. No other company can be charged with any worse conduct on the smoke subject, but one or two are near the head of the procession in the smoke line, while they lag along behind in public estimation and the stock market. Let us get at the bottom of the fuel question and see if we cannot economize in burning our smoke and cinders.

## Valve Motion, Canadian Pacific Railway.

The accompanying illustration represents the valve motion used on the Consolidation engines of the Canadian Pacific Railway. One of these engines was illustrated and described very fully in our issue of May 6, 1887.

It will be noticed that the link is hung above the centre in



order to correct the distribution, which is given in the following table:

20 cents transfer charges at Duluth, will cost \$4.70. Limestone for fluxing is now being delivered at Duluth for \$1.15

### CANADIAN PACIFIC RAILROAD.

#### RECORD OF VALVE MOTION FOR CONSOLIDATION ENGINES.

Cylinders 19" x 22", Steam ports 13" x 18", Exhaust 31" x 18", Lap 13", Lead 3", each opening. Clearance of link at top 3/8", at bottom 1/8". Throw of eccentrics 5 1/2 in.

NOTCH.	Port.	FORWARD GEAR. Fall of Link, 5 1/2".						BACKWARD GEAR. Rise of link 5 1/2".					
		Half travel.	Lead.	Cut-off.	Exhaust.	Compression.	Pre-admission.	Half travel.	Lead.	Cut-off.	Exhaust.	Compression.	Pre-admission.
Full gear.	Front	In. 2 1/2	In. 3 1/2	In. 19 3/8	In. 21 1/8	In. 21 7/8	In. 3 1/2	In. 2 1/2	In. 3 1/2	In. 19 3/8	In. 21 1/8	In. 21 7/8	In. 3 1/2
	Back	2 1/2	3 1/2	18 3/8	21 1/8	21 7/8	3 1/2	2 1/2	3 1/2	19 1/8	21 1/8	21 7/8	3 1/2
Half gear.	Front	1 1/2	3/4	13 3/8	19 1/8	19 7/8	3/4	1 1/2	3/4	14 3/8	19 1/8	19 7/8	3/4
	Back	1 1/2	3/4	13 3/8	19 1/8	19 7/8	3/4	1 1/2	3/4	15 3/8	19 1/8	19 7/8	3/4
Quarter gear.	Front	1/2	1/4	7 3/8	16 1/8	15 7/8	1/4	1/2	1/4	9 3/8	17 1/8	16 7/8	1/4
	Back	1/2	1/4	7 3/8	16 1/8	15 7/8	1/4	1/2	1/4	9 3/8	17 1/8	16 7/8	1/4

The lengths of bearings and diameters of the principal pins about the engine are given below:

	Length.	Diameter.
Front and back crank pin	3 in.	3 3/8
Intermediate "	3 1/2	3 3/8
Main "	5 1/2	4 1/2
Connecting rod	5	4 1/2
Eccentric rod	2 1/2	1
Die block	3 1/2	1 3/4
Valve rod (top rocker)	3 1/4	1 3/4
Saddle pin	3	1 3/4

The bearing surfaces might be increased with advantage. The eccentric rod pins are especially small. The present writer has used pins 2 in. diameter for all engines with cylinders 18 in. diameter and upwards and found that the increased bearing surface greatly prolonged the life of the pins and links. The larger pins are of course more expensive in first cost, but are far more durable and the smaller amount of slack or slobber produced by wear conduces to a better distribution of steam.

### The Duluth Meeting of the American Institute of Mining Engineers.

After unusual wanderings by Salt Lake, Butte City and the Yellowstone Park, the Institute got finally to Duluth, and from the excellent report of their doings there, as given in the *Iron Age*, we make some abstracts:

The first session was held in the Opera-House, Mayor Sutphin, in a few well-chosen words, welcoming the Institute, followed by Secretary Phelps, of the Duluth Chamber of Commerce, who dwelt at greater length on the resources of the Northwest. Dr. R. W. Raymond responded in an eloquent speech, in which he admirably sketched the policy of the Institute, traced the brilliant results of the course pursued, and dwelt on the position which mining occupies in modern civilization.

Mr. John Birkinbine, one of the vice-presidents, who occupied the chair in the absence of the president, Dr. Eggleston, read an address on the commerce of Lake Superior and the mineral resources of that region. The statistics of traffic through the Sault Mary's Falls canal were given with so much greater fullness in the *Railroad Gazette* of March 4, that they will not be repeated here. About 90 per cent. of the Lake Superior grain shipments of 1886 passed through Duluth grain elevators, the storage capacity of which is being augmented this year from 11,000,000 to 19,000,000 bushels.

The receipts of coal, for which there are ample facilities, have risen from 163,000 net tons in 1880 to 732,000 net tons in 1886, and are expected to rise to fully 1,000,000 net tons this year. The rapidity with which cargoes are handled in Duluth will be appreciated when it is stated that the feat has been accomplished of unloading 2,000 tons of coal, cleaning the vessel and loading it with over 80,000 bushels of wheat between the rising and setting of the sun. There can be no doubt that Duluth possesses unrivaled facilities, which the energy and enterprise of its citizens are fully taking advantage of. Mr. Birkinbine, in his address, dwelt upon the fact that in the older Lake Superior mining districts a very heavy percentage of the total output came from a comparatively small number of large mines, and then gave a brief sketch of the Vermillion and Gogebic iron ranges, alluding at the close to the possibilities of Duluth as an iron manufacturing centre.

#### SHOULD DULUTH MAKE IRON?

The question has been earnestly discussed for some time, both by citizens of Duluth and by capitalists, whether that town possesses sufficiently great advantages to make it a centre for the manufacture of crude and finished iron and steel. The development of the enormous bodies of ore on the north shore of Lake Superior have given impetus to this agitation, and two reports are known to have been made, one by Mr. John Birkinbine, of Philadelphia, and the other by Mr. W. F. Mattes, of the Lackawanna Coal & Iron Co., Scranton, Pa. The former has been printed by the West Duluth Land Co., and since it reviews the subject in a comprehensive manner, the following abstract of the data given may be serviceable:

One fact that has militated against the proposal to establish iron works at Duluth or its vicinity is that the industry of Lake Superior, based upon the local supply of ores, has only been a moderate success. The causes for this discouraging experience are complex, the principal ones being the lack of cheap fuel, the long distance from markets and the necessity of carrying more than six months' product while navigation is closed.

On the question of an ore supply doubts need no longer exist. Minnesota Bessemer ore, carrying 66 1/2 per cent. of iron, can be contracted for at \$5.20 per gross ton, delivered. "Red Lake" ore, a slightly leaner grade from the same source, carrying 63 per cent. of iron is available at \$4.20, and Gogebic Bessemer ores, including 50 cents freight and

per net ton, and, allowing for unloading, stocking and interest may be estimated at \$1.50 per net ton. So far as fuel is concerned the choice is offered between charcoal, anthracite coke and coking at Duluth. Mr. Birkinbine estimates the cost of charcoal at 62c. per bushel; Connellsville coke delivered at Duluth at \$5.10 per net ton, and anthracite at \$5.60. The principal advantages which Duluth possesses as a great distributing point for fuel is the cheap back freights, it having received in 1886 no less than 732,000 tons of coal, which will be considerably increased during the current year. In the estimates of cost of coke and anthracite quoted above the prices have been chosen very liberally.

Mr. Birkinbine estimates the cost of making pig iron at Duluth in a charcoal furnace, costing \$74,000, with iron pipe stoves, and \$95,000 with fire brick stoves, having a capacity of 60 tons per day, and in a coke or anthracite furnace, costing \$80,000 and \$100,000 respectively, according to stoves used, as follows:

Charcoal, \$17.58; coke, \$17.70, and anthracite, \$19.28; and he makes the following comparison of cost of raw material at Duluth, Cleveland and Chicago:

	Duluth.	Cleveland.	Chicago.
One ton Minn. ore at shipping port.	\$5.00	\$5.00	\$5.00
Freight	0.20	2.00	1.50
Dock charges or transfer	0.20	0.30	0.30
0.52 ton Gogebic ore at \$4 shipping port	2.08	2.08	2.08
Freight	0.26	1.04	0.78
Dock charges or transfer	0.10	0.15	0.15
One ton coke at furnace	5.50	3.35	5.30
Total	\$13.14	\$13.92	\$15.11

This figuring shows that so far as ore and fuel are concerned, Duluth can obtain its raw material cheaper than either Cleveland or Chicago, the saving being sufficient to allow liberally for the increased cost of labor due to advanced wages or comparatively small output. By using the leaner ores, which will not so readily stand shipment over long distances, a further reduction may be secured. Mr. Birkinbine says: "Unless pig iron of a special grade were produced, it does not appear that a large blast furnace at Duluth would possess sufficient advantages at present to favor its establishment as an independent industry; and, if established, it will probably be most desirable to operate it with charcoal as fuel, and have it of moderate size." There is more encouragement in the building of a furnace in connection with a rolling mill. The cost of manufacturing would be somewhat greater than at Chicago or Cleveland, due to an increased charge for raw bituminous coal, but this increase would not exceed the difference under ordinary conditions which would exist in favor of Duluth in freights to the district such a works would expect to supply with iron manufacturers.

#### THE DALLES OF THE ST. LOUIS.

In the afternoon an excursion was made to the picturesque Dalles of the St. Louis River, which possess a special interest to engineers, since they promise to become at some future date a very important source of power. The St. Louis River is 100 miles in length, with headwaters 1,000 feet above Lake Superior, over half the fall, however, occurring in the latter half of its flow. From Knife Falls to Fond du Lac, a distance of 13 miles, the fall is 576 feet, and from Fond du Lac to Duluth, 15 miles, there is no fall, the river being navigable by a natural channel. The Institute visited that portion extending 7 miles from Fond du Lac to Thomson, in which distance the falls aggregate 480 feet. Mr. Birkinbine estimates that with a minimum flow of 0.3 cubic feet per second for each square mile, the drainage area being nearly 4,000 square miles, provision should be made for the application of 150 horse-power for each foot of fall available. About 5,000 horse-power could be developed at Fond du Lac, so located that vessels could come to the site of mills or factories for their load of plows or other manufactures.

The paper of the evening was that of Mr. Larsson, of Iron Mountain, Mich., on

#### THE CHAPIN IRON MINE.

located on the Menominee Range, which since its discovery in 1880 has produced 1,500,000 tons of soft blue hematite, containing about 63 per cent. of iron and 0.07 per cent. of phosphorus. A detailed account was given of the deposits and the methods of working them. In 1884 it was found necessary to abandon the methods theretofore used, of breast stopping in 18-foot rooms, both on account of the soft nature of the ore and the growing scarcity of sufficiently heavy timber. The mines are now worked by the filling system. In the filling system a level is driven in the rock of the foot wall and the men work 50 feet from each other in the ore drift, run parallel with the main rock level, making cuts about 8 ft. high and 9 ft. wide clear across the ore. These openings are then filled with rock either before or at the same time as other cuts of the same size are made on the side of the first ones. A third slice is then taken off, and the second filled in the same manner, and so on until the whole first stope is mined out. As the filling must be kept close to the back—within 5 feet—in order to prevent caving of the ore, it is necessary to shovel most of it. It should, however, be borne in mind that as the solid ore is mined and

loose rock takes its place, and as the specific gravity of the ore is at least one and one-half times greater than that of the rock, it is not necessary to handle more than 4 tons of rock for every 10 tons of ore mined. The rock mined in drifts and shafts is, of course, used to fill the excavations of the ore. As, however, the quantity is not large enough a suitable filling material is obtained from an adjacent sandstone quarry, from which it is trammed to one of the hoisting shafts and lowered in one of the balanced cages used for hoisting to the level next above the lift where the ore is mined. From there it is taken to the nearest rock winze and dumped.

All the mining machinery at the Chapin and at its neighbor, the Ludington, is driven chiefly by compressed air furnished by three pairs of 32 x 60-in. Rand compressors, run by three independent vertical 48-in. inward-flow turbines, and one 36 x 60-in. compressor, driven by a 54-in. turbine of the same type; the power being transmitted by gearing, reducing the speed four times. The power for the turbines is obtained from the Quinnessee Falls of the Menominee River, 3 miles from the mines, the head being 47 ft. The average production of air by the compressing plant during the last year for 24 hours was 1,827,350 cubic feet of 60 lbs. pressure, the average speed of the three compressors then running being, stoppages included, 29.41 revolutions per minute, while the average pressure was 60.84 lbs. The pressure at the mines was from 2 to 3 lbs. less.

In conclusion, Mr. Larsson presented the following interesting tables on the effect of labor and of powder (Atlantic, with 27 per cent. of nitro-glycerine):

#### Effect of Labor at the Chapin Mine.

YEAR.	Tons per man per day.			Feet per man per day.		
	Broken in slopes.	Loaded and trammed from stock pile.	Loaded and trammed in mine.	Drifts.	Winzes.	Shafts.
1884	9.46	23.75	24.4	0.513	0.479	0.077
1885	6.37	20.08	25.4	0.535	0.774	0.081
1886	6.77	16.50	31.0	0.610	0.498	0.115

#### Effect of Atlantic Powder in Contract Work.

	1884.	1886.
Tons of rock broken per pound of powder	5.96	5.00
Drifts, feet	4,024.00	10,159.00
Powder used, pounds	11,680.00	29,113.00
" " pounds per foot	2.90	2.86
Winzes, feet sunk	2,208.00	1,938.00
" " pounds powder used	4,870.00	4,235.00
" " " per foot	2.21	2.18
Shafts, feet sunk	620.00	242.00
" " pounds powder used	5,320.00	2,455.00
" " " per foot	8.58	10.13

The session closed with the reading by the secretary of a paper by Prof. T. B. Comstock, of Champaign, Ill. entitled "Notes on the Region North of the Vermillion Lake District, in British America." The next day was devoted to a visit to the mines of the Minnesota Iron Company Syndicate.

#### VERMILLION LAKE MINES.

A special train furnished by the Duluth & Iron Range Railroad took the engineers to Two Harbors, where the docks were visited. These have a storage capacity of 14,000 tons, there being 16 ft. of water at the dock. At the present time a crib is building, and a breakwater is contemplated, together with additional docks. It is stated that the average of last year's freights to Lake ports was \$1.35, while the contracts for this year were made at \$1.75 per ton. From Two Harbors the party journeyed to the mines luncheon being served on the train.

Mr. Stuntz, of Duluth, gave, by the way, some particulars of the history of the region. He discovered the out crop of ore in 1865. Explorations were made in 1875, for Messrs. Tower and Munson, but it was not till 1880 that development work was begun. The difficulties of this exploration work will be appreciated when it is understood that every pound of supplies had to be carried by canoes up the St. Louis River and the chain of lakes and swamps to its headwaters, near the seat of operations, the journey taking fully 10 days. The cost was enormous, relatively speaking, and the idea of developing the deposits in so inaccessible a country seemed and was generally pronounced preposterous. In 1881, Mr. Wright, of Marquette, visited the region in the interest of Mr. Tower, and in 1882 the work of locating the railroad to Agate Bay, a distance of 70 miles, was begun. The years 1883 and 1884 were consumed in making the needed preparations and in completing the road, at a necessarily enormous expense. It is generally reported, that those nearest to Mr. Tower were urgent in advising the abandonment of what appeared a foolhardy enterprise. No one can view the magnitude of the undertaking and contemplate its numerous difficulties, considering at the same time the depressed condition of the iron-ore markets of the country during that period, without admiring the pluck and the determination which carried it through. It is estimated that not less than \$3,000,000 must have been required to carry out the explorations, develop the mines, build the road and provide dock facilities, before the property was in shape to pay a dollar in return for the investment. In August, 1884, the first shipments were made, the season's sales being 62,124 gross tons. In 1885 the quantity rose to 225,484 tons, went to 304,396 gross tons in 1886, and will reach 400,000 during the season between May and November of the current year. In 1885 work was begun in extending the railroad from Two Harbors to Duluth, the work being completed in 1886.

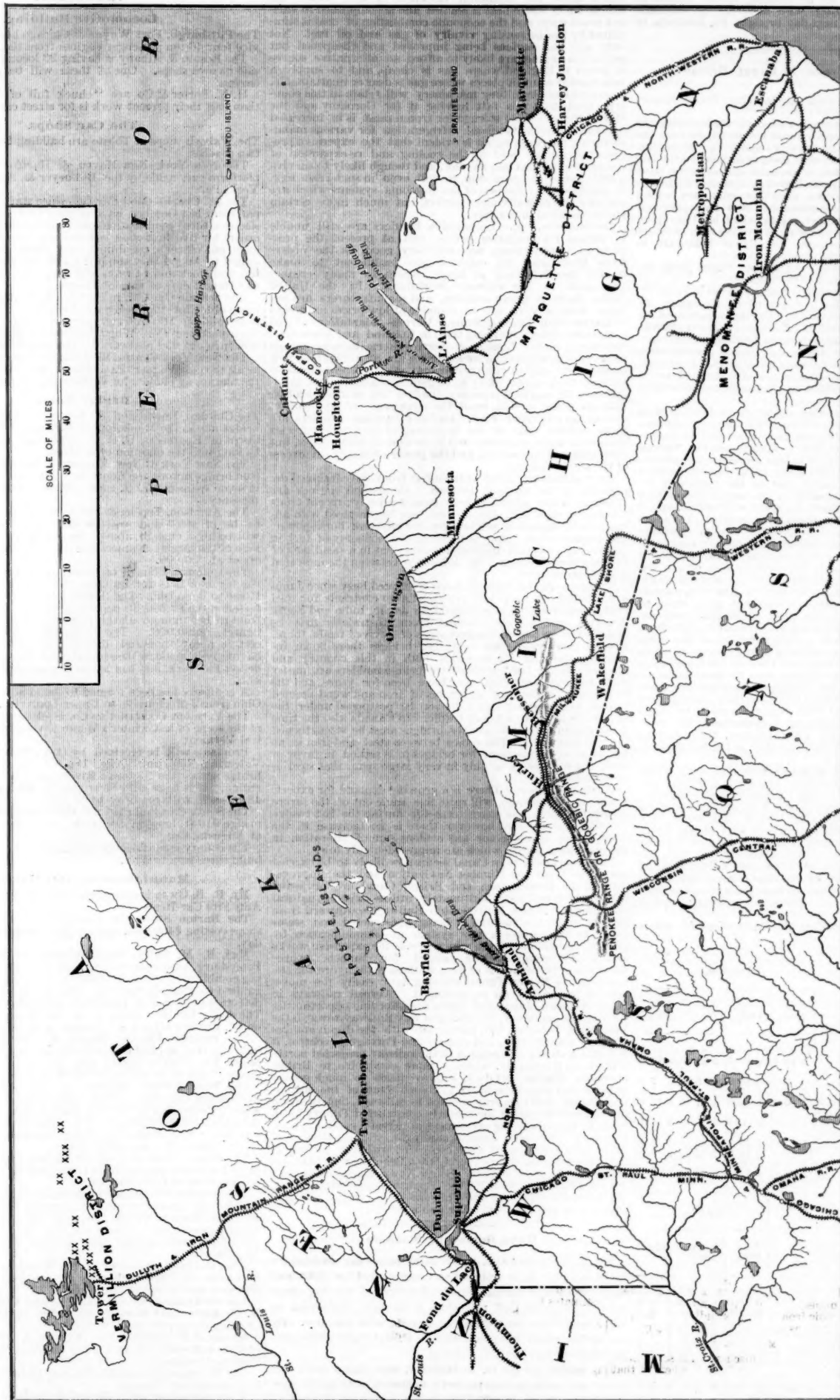
The product of the mines is divided into three grades, the first, called Bessemer, being guaranteed to carry not less than 66 1/2 per cent. of iron and under 0.66 per cent. of phosphorus. The second class, called Minnesota, is guaranteed to carry 66 1/2 per cent. of iron, but is sold without guarantee as to phosphorus, while the Red Lake ore contains not less than 62 per cent. of iron, but without any limitations as to phosphorus. It is stated that this season's contracts of the company are distributed as follows: 230,000 tons of Bessemer, 100,000 tons of Minnesota and 70,000 tons of Red Lake. The ore has been sold to go so far East as Troy, the works there having taken 30,000 tons at \$7. delivered.

The following table shows the output of the different openings, together with the date on which work was begun on them, to July 25:

Output to July 25, from date of opening.	When opened.		Total product.
	Aug. 1, 1884.	Aug. 1, 1884.	
Stuntz	May 1, 1884.	24,389	
Stone	May 1, 1884.	239,866	
Ely	Dec. 29, 1886.	88,407	
Tower No. 1	July 20, 1884.	214,794	
Tower No. 2	April 11, 1886.	173,831	
Bretung	May 5, 1884.	62,098	
Lee	Dec. 13, 1884.	50,270	
Total		853,565	

The mines are rapidly approaching the stage where underground work will become necessary; in fact, at the Stone and Tower pits this period has now arrived. This will involve a greater concentration of hoisting and handling, and a





THE IRON MINING REGIONS OF LAKE SUPERIOR.

(NOTE.—The Duluth, South Shore &amp; Atlantic should be shown to the Montreal River, north of Hurley.)

with it larger machinery plant. A set of four drums is now on the ground and will be started at an early date. At the Stone pit the cars hoisted are sent to the pockets over an automatic three-rail incline plane. This change to underground work will lead to some increase in the cost of mining, carrying it close to \$2 per ton on railroad cars at mine. In all 1250 men are employed at the mines at Tower, exclusive of railroad hands. The output in July will probably reach 40,000 tons, the product in the winter months of course being considerably less. During the summer as large a quantity as possible is sent direct to the shipping port. Still some stocking is unavoidable, and after the closing of navigation all the product must be stocked. This involves rehandling, which will carry the cost close up to \$2 a ton. Estimating the cost of transportation—70 miles—to Two Harbors and dock charges at a minimum of \$1, the ore would cost on board vessel \$3. Freight to Cleveland and other points this season were contracted at \$1.75, against about \$1.35 last season, which would put the cost delivered on dock at \$5, leaving a hand-

some profit. Even allowing for higher cost of mining in the future, there seems little doubt that for some years to come the Minnesota company can deliver their ore vessels at Two Harbors at \$3.50, or a little over 5 cents a unit, to which must be added interest on \$2,000,000 bonds on the railroad, equal, roughly, to 50 cents a ton. By adding the lake freights and dock charges to this figure a rough estimate may be arrived at of the cost which the producers of other regions must meet in times of sharp competition. Whether or not that time will come next year or a year later will depend very largely upon the demand for steel rails. In the immediate vicinity of the Minnesota company's mines explorations with the diamond drill have begun. Two additional drills are to be similarly employed at an early date.

Explorations are going on to the northeast of the Vermilion mines, and it is in that direction that the proposed extension of the Duluth & Iron Range Railroad is to be carried. The surveys on this road have only recently begun. There is considerable talk of a railroad from the excellent harbor

of Grand Marais into the district to the north, but as yet, so far as known, no steps have been taken to carry out the project. There seems every prospect that in 1888 the shipments from the Vermilion range will include the product of other mines than those now included in the Minnesota group.

On Thursday morning the members bade goodbye to hospitable Duluth, and taking a train tendered by the Northern Pacific, proceeded to Ashland. On the way a short stop was made at the point where the Ashland Furnace Company is putting up a new charcoal furnace 60 feet high, with 12-foot boiler. In 12 weeks, in spite of some delays through slow delivery of stone, the shell of the furnaces and of the two Whitwell hot-blast stoves is nearly completed. The company owns 47 acres of land and a frontage of 600 feet on the lake, and is even now discussing the question of putting in two 5-ton Bessemer converters.

The party then viewed the great ore docks of Ashland, and after being the guests at dinner, at the Chequamegon House, of Messrs. Moore, Benjamin & Co., a tour around the



harbor, being entertained in the evening by the citizens of Ashland, the supper ending with a series of informal speeches and toasts. The next day brought the Institute to the Gogebic range.

### The State of Trade in Great Britain.

Messrs. Matheson & Grant's Engineering Trades Report dated London, July 16, states:

There has been a decided amelioration of trade during the last six months, and the improvement we anticipated for the spring is every week becoming more manifest. Manufacturers find that as compared with their experience of the last two years a larger proportion of inquiries and estimates have actual results, while the unprecedented cheapness of materials and consumable stores, allows, notwithstanding low selling prices, a profit otherwise unobtainable. New enterprises of various kinds continue to absorb capital which has been lying idle, and as there is hardly any sort of commercial venture which does not give employment directly or indirectly to engineers, a growing activity may be looked for.

Coal has advanced in price. At South Wales ports the shipping facilities are strained to the utmost.

Iron of all kinds is at almost the same prices as in January, the slight speculative rise due to hopes of an American demand having been only temporary. The manufacture of finished iron allows no real profit if the deterioration of plant be considered; puddling furnaces continue to diminish in number, and the prospects for the future, even if general trade improve, are clouded by the growing use of steel. For smithing purposes high-class Yorkshire iron is still deemed necessary, and for many important uses is considered safer than steel.

Steel makers are busier and altogether more hopeful than at the beginning of the year, although the large productive power of the principal works and new economies in manufacture together keep prices low. Plates and the various forms of sectional steel used by bridge builders are obtainable at prices lower than would have been deemed possible two years ago, this being partly due to the slackened demand for ship building and partly to the competition of new works. The rail mills are fairly occupied with orders, and it is not unlikely that there may be a revival of export trade to the United States. Owing to the peculiar operation of the customs tariff exports thither have mainly been confined to partly manufactured steel, such as blooms and billets of which there have been large shipments. But orders for rails have also been coming forward lately. Notwithstanding the enormous power of production in America, exceeding two million tons per annum, the present price there of \$40 per ton is about equal to the price of English rails delivered duty paid at an American port. Primarily, therefore, the competition is determined by the situation of the place of inland delivery, which, as regards transport, is in some cases more favorable to the imported than to the home-made rail. The conditions of quality have also to be considered, and in this respect some of the American railroad engineers consider that they can get better value for their money here than at home. It is not that rails as good cannot be made there, but owing to the rapidity of manufacture, the combinations of makers and other circumstances, the terms of American specifications are less favorable to the buyers than those enforced here.

The considerable advance in scrap iron and steel which took place last autumn, owing to an expected American demand, was not justified by events; prices fell considerably, and business is at present dull. There is no market for scrap at the Atlantic ports of the United States, but large shipments have been made during the current year to San Francisco. Italy has been the principal buyer of old iron rails at prices of about 63s. 6d. for double-heads and at 62s. for flange rails, including freight, but at present sellers demand 2s. to 3s. more, the supply of old double-head rails being restricted by the railway companies and private speculators holding them for better prices. There is a growing inquiry for old steel rails.

The following table summarizes the fluctuations in values during the last five years:

	Per Ton.			
	July, 1882.	July, 1883.	July, 1884.	July, 1885.
Steam coal, f. o. b. at Cardiff	£. s. d. 0 10 9	£. s. d. 0 12 0	£. s. d. 0 11 6	£. s. d. 0 10 3
West Hartley coal, f. o. b. at Newcastle	0 9 0	0 10 0	0 9 6	0 9 6
Pig-iron at Glasgow, No. 3	2 9 6	2 7 6	2 1 6	2 1 0
Pig-iron at Middlesbrough, No. 3	2 3 6	1 19 6	1 17 0	1 12 0
Iron ship plates at Middlesbrough	6 15 0	6 0 0	5 0 0	4 15 0
Iron bridge plates in South Yorkshire	7 15 0	7 10 0	6 15 0	6 0 0
Steel ship and bridge plates	10 10 0	9 10 0	7 15 0	7 2 6
Iron rails, f. o. b.	5 5 0	5 0 0	...	...
Steel rails, f. o. b.	5 10 0	4 15 0	5 0 0	5 0 0

	Per Ton.		
	July, 1886.	Jan'y, 1887.	July, 1887.
Steam coal, f. o. b. at Cardiff	£. s. d. 0 8 0	£. s. d. 0 8 6	£. s. d. 0 9 3
West Hartley coal, f. o. b. at Newcastle	0 8 3	0 8 0	0 8 6
Pig-iron at Glasgow, No. 3	1 19 0	2 4 6	2 2 6
Pig-iron at Middlesbrough, No. 3	1 10 0	1 14 0	1 14 6
Iron ship plates at Middlesbrough	4 7 6	4 12 6	4 12 6
Iron bridge plates in South Yorkshire	5 5 0	5 7 6	5 7 6
Steel ship and bridge plates	6 5 0	6 5 0	6 5 0
Iron rails, f. o. b.	...	...	...
Steel rails, f. o. b.	4 0 0	4 5 0	4 3 0

**Mechanical Engineers.**—The numerous branches of trade included under this heading have for the most part felt a decided though moderate improvement during the last six months, and the very diversity of the causes for this revival is a sign that the improvement is widespread. Among marine engineers there is as yet no indication of a return to the activity of 1883, and though there are signs that the demand is growing, yet even if to the large ocean and war steamers on hand be added the special craft of various kinds which are building, such as river steamers, torpedo boats and dredgers, the aggregate does not show any marked improvement on the trade of last year. Machine-tool makers are already feeling the renewed inclination and power to purchase of their customers the engineers, and are offering various automatic and labor-saving novelties, the present exhibitions at Newcastle and Manchester showing that in these respects this country retains the lead against foreign competition. Economy in fuel has evidently not reached its final stage; the use of high pressure steam leads to various alterations of old methods; there are improvements in corrugated boiler flues

which allow the minimum thickness of steel plates; the utilization of waste heat is studied and accomplished in various novel ways and the economic combustion of coal is stimulated by the increasing rivalry of gas and oil fuel. Not only are gas engines being improved and cheapened but petroleum engines are likely to afford an alternative source of power in England where gas is cheap, and to supply a long-needed want in places where gas is dear or unobtainable. Improvements in milling machinery will retain in this country a trade that was fast leaving it for Germany and the United States. Cold storage for frozen meat is in increased demand as well as artificial refrigeration for various manufacturing purposes, and it is evident that the expensive process of producing cold by the cooling and re-expansion of compressed air has had its day, and though likely to survive a little longer on board ship, it will even in such cases soon be superseded by the best of the ammonia systems which are not only theoretically more perfect, but much more certain and economical in practice.

**Locomotives, etc.**—Locomotive builders are still unable to obtain remunerative prices, and at present the prospects of improvement are not very good, as the orders from India and the colonies are insufficient to make up for the deficiency at home, where so many engines are made in the railway workshops. In the United States there is great activity, and manufacturers are less eager than a year ago to compete at low prices in foreign countries with English firms. Various adaptations of the compound system are being tried in England and elsewhere, but except on the London & Northwestern Railway, where an increasing number of such engines are at work, these new methods are only in an experimental stage. The automatic vacuum brake seems likely to be generally adopted, for in addition to the merits it possesses, the fact that so many leading lines are using it will, from the advantages of uniformity, discourage any other kind. Railway carriage builders are more hopeful than at the beginning of the year; inquiries seem to be more numerous and to rest on a sounder basis, but competition is still severe, and the power of supply in excess of the actual demand.

**Agricultural engineers** still suffer from the continued depression of the farming interest. Compound engines are receiving wider attention here than formerly; recent trials seem to show that this system can be practiced with advantage in engines of not less than 20 effective horse-power, the improvement lying not merely in economy of fuel in generating a certain indicated power, but in a steadiness of running that diminishes the difference between the indicated and effective force.

**Bridges.**—Bridge builders have continued busy since January, though at very low prices. Large contracts for steel bridges are in course of execution for Japan, India and South America, and a fresh demand from Australasia may be anticipated as one of the first signs of revived trade there. Besides new enterprises requiring bridges there is an increasing demand for renewals both in this country and abroad. In the United States the bridge builders are busier with railway work than they have been for years, and the re-building of the frail structures of iron and wood erected in past years cannot much longer be postponed under the exigencies of modern heavy traffic. In Canada also the time is not distant when the earlier bridges must be strengthened or re-constructed. The choice between steel and iron is no longer an open question; for bridges it is settled in favor of steel, but for roofs it is only in very large spans that steel is as yet adopted.

**Portland Cement.**—There is a growing demand for export, which, if it continues, will raise this trade out of the severe depression which has characterized it during the last twelve months. At present, however, there is no increase in the consumption at home nor any evident sign of alteration in the prevailing prices, which are unprecedentedly low.

The Manchester Ship Canal seems now likely to be carried out. The Trent and Humber Navigation and the improvement in the Birmingham and Bristol Canal are projected works which will more legitimately utilize existing natural advantages. A new Metropolitan Railway, southward from the city under the Thames, is being constructed and seems likely to inaugurate a new system of communication by piercing the soil at a depth which avoids the expensive works and heavy compensations needed for tunnels nearer the surface, the example of deep stations with hydraulic elevators at the Mersey Tunnel showing how easily the movement of passengers can be arranged. Abroad railways in South America, Japan and China are affording opportunities for English engineers. The Delagoa Bay Railway, towards the Transvaal, is begun, but hampered by the disadvantages of cheap construction, bad climate and Portuguese control, it will find a strong competition in the railway projected northward from Kimberley, which is more conducive to British interests. Harbor and dock improvements so much needed at home and abroad are likely to absorb some of the surplus professional skill formerly devoted to railways, but the commercial non-success of the recently constructed Tilbury Dock tends to discourage the investment of private capital in such ventures. The lull in colonial enterprise still continues and is the more conspicuous when compared with the activity in the United States, where over 4,000 miles of new railway are being constructed this year. South America appears at present one of the best fields for the English engineering trades, the Argentine Republic and Chili especially taking the lead just now in railways and other public works.

### Band Re-sawing Machine.

We illustrate herewith a new band re-sawing machine for rapid sawing. It is designed and constructed for light and heavy work, and has an improved system of gearing—having the two front feed rolls close to the saw blade, and an ingenious device connecting the top of roller brackets. By this arrangement the plank may be straightened while sawing, thus saving time and material.

The wheels are 60 in. in diameter, with large hubs and spokes and built up rims perfectly balanced, with large steel mandrels running in self-oiling boxes, and so connected to the mandrels as to make it impossible for them to get loose and run out of true. Each wheel is supported by an outside bearing on each side of the column, there being three bearings to both upper and lower shafts.

The feed consists of six large feed rolls, heavily geared, driven by the Egan graduating feed, and the operator is enabled to change the feed instantly, while the board is being fed through the machine, by turning a hand wheel. A ratchet lever is connected to the upper guide and so arranged as to adjust the guide instantly to the width of the board. The machine is said to work equally well in hard or soft wood. It cuts 36 in. wide and 12 in. thick. Several pieces of narrow stuff can be cut placed between the rolls one above the other. The rate of feed is from 0 to 50 feet per minute.

Further particulars may be had by addressing the makers, The Egan Co., 208 to 292 West Front street Cincinnati, O.

### TECHNICAL.

#### Locomotive Building.

The Pittsburgh, Fort Wayne & Chicago has just put in service four 46-ton passenger engines from the Altoona shops.

The Boston & Albany is having 23 locomotives built outside its own shops. One of them will be a 43-ton freight engine.

H. K. Porter & Co. are "chuck full of business." More than half their present work is for street car service.

#### The Car Shops.

The Wabash shops at Toledo are building two chair cars and two coaches.

The New York, New Haven & Hartford is having 100 platform cars made by the Billmeyer & Small Company at York, Pa.

The St. Charles (Mo.) Car Co., since starting their car department last October, have shipped 14 first-class coaches, 10 sleepers, three combination and 18 baggage cars. They have orders for five first-class coaches, 12 combination, 11 baggage, one officer's, one dining and seven chair cars. From Jan. 1 to Aug. 1 they shipped 1,179 coal and flat cars, 1,240 box and stock and 14 way, and have orders for 1,828 stock and freight cars of various classes.

The Buffalo Car Co., in Buffalo, N. Y., has just finished a large order for the Delaware, Lackawanna & Western and is now building 100 refrigerators for the Merchant's Despatch Transportation Co. When that order is finished the company will turn out 250 coal cars for the Pine Creek road.

The New York Central Sleeping Car Company will, as soon as all the old Wagner Palace cars have been rebuilt, enter the market as bidders for carbuilding for other companies.

#### Bridge Notes.

The Chicago, Burlington & Northern thinks of building a bridge across the Mississippi at Dubuque. Ma or Mackenzie, Corps of Engineers, U. S. A., with other engineers are now looking into the question of location.

The New York & New England is to build a double track iron bridge across the Connecticut at Hartford. It will be in seven spans of 150 ft. each. Stone is now arriving for the masonry.

The Atchison, Topeka & Santa Fe bridge at Sibley, Mo., is to be of steel and will be more than a mile long. It will be high enough above the water to admit of the passage of the largest steamers beneath it. The bridge will cost about \$1,250,000.

The Common Council of Detroit has been forced to advertise for new bids for building the bridge over the Detroit River to Belle Isle. The Detroit Bridge & Iron Works has forfeited the \$2,500 it deposited when it accepted the contract rather than go ahead and build the structure at its figures, \$280,000. The company says the job would cost it many thousand dollars more than this, an error having been made in the estimates for the substructure. This delays the work, and has led to any amount of public discussion.

A company has been formed to build a bridge across the Ohio from Jeffersonville to Upper Louisville.

The Vermont Construction Co. is putting up an iron bridge at the scene of last winter's White River disaster on the Central Vermont.

Proposals will be received by G. L. Fisher, County Clerk, Valentine, Neb., until Aug. 18, for the construction of a bridge across the Niobrara River, three miles north of Valentine. It is to be either one span of 96 ft. or two spans of 48 ft. each, with roadway 14 ft. wide.

The South Carolina road has just completed a Howe truss bridge 910 ft. long, in five spans, across the Savannah River at Augusta, Ga.

The county commissioners of Austin County, Minn., will build three iron bridges.

#### Manufacturing and Business.

Mr. R. B. Owen is appointed General Agent of the Martin Anti-Fire Car-Heater Co.

The Burton Stock Car Co. will build, at Wichita, Kan., shops costing \$450,000, and with a capacity of 16 cars a day.

Maj. R. M. Sully, Superintendent of the Richmond & Petersburg, has obtained a patent for a seal-lock and seal-tag combined, for freight cars, and a company has been organized to manufacture it. The tag is designed to make detection of broken or imperfect seals easy and convenient. The device has been adopted by the Georgia Pacific, Richmond, Fredericksburg & Potomac, and Atlantic Coast Line.

The Stocker Electric Signal & Motor Co.'s electric light has been applied to a train on the Atchison, Topeka & Santa Fe. This company also has an electric automatic brake "said to be similar to the Westinghouse."

The Westinghouse Machine Co. has shipped during the past month engines to electric light companies in Pittsfield, Mass.; Parkersburg, W. Va.; Easton, Md.; Hartford, Conn.; Alliance, O.; Hot Springs, Ark.; Sheffield, Ala.; Washington, Kan.; San Francisco, Cal.; Gadsden, Ala.; Plainfield, N. J.; Olney, Ill., and other places.

The office of the Cowles Aluminum and Smelting Company has been removed from Cleveland to Lockport, N. Y., where the works are situated.

The Scarritt Furniture Company, of St. Louis, makers of all kinds of chairs for railroad purposes, from drawing-room furniture down to freight cabooses, have just completed a finely-equipped new factory designed especially for the railroad department of their business, and have engaged some English artists.

John Caldwell, treasurer of the Westinghouse Air Brake Company, of Pittsburgh, says the company is not about to establish new works at Rock Island, Ill., as reported.

The stockholders of the page Belting Company, Concord, N. H., have voted to ratify the action of the officers in increasing the capital stock to \$300,000.

Messrs. J. P. Marsh & Co., of Chicago, are making 2,000 of their automatic air valves for the Baker & Smith Steam Heating Company.

The McDonald Pneumatic Railway Gate Company has been incorporated at Chicago.

A correspondent at Indianapolis, Indiana, writing of his city, says: "The machine shops are full of work, and some of them are running overtime. It is stated that never in their history have the machine works of Indianapolis been as prosperous as this year. One of the firms has gone into the manufacture of circular saws eight ft. in diameter."

Messrs. Sherburne & Co., of Boston, Mass., are soon to commence the manufacture of steam gauges.

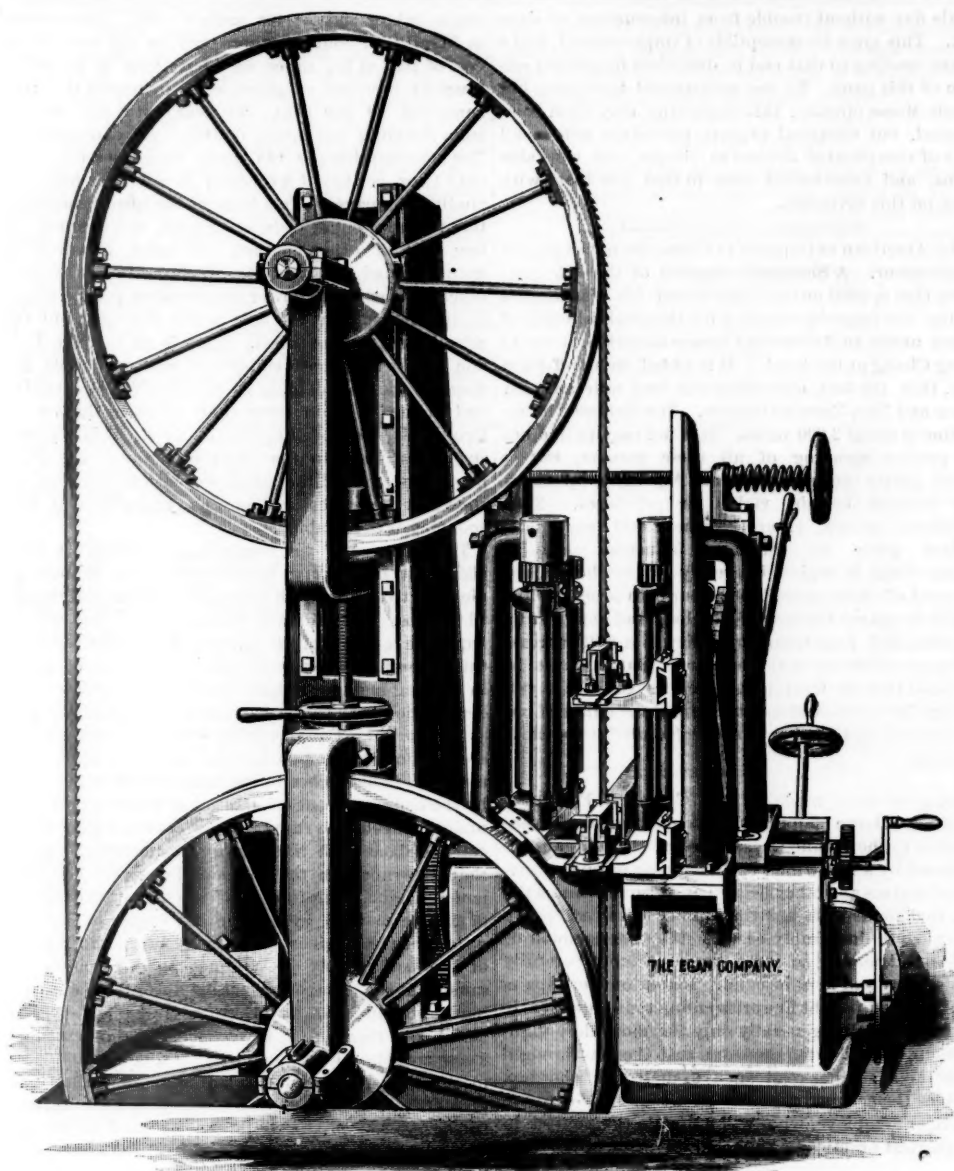
The Baltimore & Ohio has contracted with Neape & Levy, of Philadelphia, for an iron vessel for service in New York harbor. It is to be 107 ft. long, 22 ft. beam, and 11 ft. depth of hold.

The Pratt & Whitney Company, of Hartford has taken the contract for the manufacture in this country of the Hotchkiss arms. Considerable enlargement of their shops will be made necessary.

#### Iron and Steel.

The Catsauqua Manufacturing Co., of Philadelphia, is building one of the largest plate mills in the country, to cover about 300 by 600 ft. New machines are being put in. The Sharon Steel Casting Co., of Sharon, Pa., has opened





BAND RE-SAWING MACHINE.

Made by THE EGAN CO., Cincinnati, Ohio.

an office in Chicago at 117 Monroe street, with F. P. Davidson as Agent.

The Pottsville Iron and Steel Company's No. 3 furnace at Pottsville, Pa., was relighted on the 2d inst., after four years' idleness.

Oliver & Co.'s rolling-mill, Easton, Pa., which shut down some months ago on account of lack of orders, has been repaired and will start up soon.

The new Bessemer steel works, rolling mill and nail factory of the Chicago Steel Company, at Hammond, Ind., have been leased for five years to a syndicate of Wheeling iron and steel manufacturers, who will operate the works under the name of the East Chicago Steel Co. It is expected that the syndicate will erect a blast furnace.

Furnace B., of the Low Moor Iron Co., of Lowmoor, Va., went into blast July 27. Its capacity is 4,000 tons per month.

#### The Rail Market.

**Steel Rails.**—No business of any consequence has been done reported inquiries still hanging fire. The Missouri Pacific is expected to buy 35,000 to 50,000 tons for winter delivery. Quotations are: \$38.50@39 for early delivery, \$38 for fall, and \$37@37.50 for winter.

**Old Rails.**—Holders ask \$24 for Tees and \$25 for double-heads, but buyers still hold off.

**Scrap.**—More active, No. 1 \$21@22; selected \$23. Old wheels, \$17.50@18.50; old steel rails, \$20@21.

Spikes, \$2.45@2.50.

#### Consolidation of Gogebic Iron Interests.

The Chicago Tribune says a syndicate headed by Wm. Windom, Jesse R. Grant and S. W. Dorsey has established two iron trusts, including all but two of the 21 Gogebic mines, which cover 21,000 acres of mineral lands, with an annual output of 1,000,000 tons. One "trust" is called the Lake Superior Consolidated Iron Co., and is organized in Wisconsin with stock of \$10,000,000, and \$6,000,000 6 per cent. 15 year first mortgage bonds. Windom is president. The other trust is the Bessemer Consolidated Iron Co. Ultimately they will be consolidated into one corporation. The price paid for the 19 mines was \$6,870,000. The Lake Superior Co. has 15 mines, for which it pays \$4,550,000, and the Bessemer four, the price of which was \$2,320,000.

**New Steamer for the Old Colony Steamboat Co.** John Roach's Sons, at Chester, Pa., have received the contract to build a side-wheel steamer for the Old Colony Steamboat Co., of New York. The contract price is \$1,500,000. The boat will be a counterpart of the Pilgrim. The new vessel, which will be known as the Puritan, will be 386 ft. long over all and 87 ft. wide over guard line; her depth will be 18 ft. 6 in., and from the top of the dome to the base line will be 60 ft. She will be fitted with 253 staterooms, and will have 200 berths besides. The hull is to be on the double hull, bracket plate, and longitudinal system. In addition to these compartments six water-tight bulkheads will extend to the main deck. The A. & W. Fletcher Co.'s North River Iron Works in this city will build the engines, which will be compound beam. Some of the dimensions will be:

High pressure cylinder, 75 in. diameter and 9 ft. stroke; low-pressure cylinder, 110 in. diameter by 14 ft. stroke. Eight boilers, constructed for a working pressure of 110 lbs. per square inch; feathering wheels of the style on the new fast City of New York. Compared with the Pilgrim her power will be about 42 per cent. greater, which, with the improved paddles is estimated as perhaps equal to a 25 per cent. increase in speed. The Pilgrim has 5,300 horse-power and the Puritan will have 7,500.

#### Cannel Coal in Kentucky.

A Louisville dispatch says that responsible parties (who, however, do not state the exact location) have discovered near Cloverport, Ky., a fine vein of cannel coal. "It has a thickness of four feet, and is very rich in combustible material. The coal is said to be only two miles from a railroad. The vein is easily worked. The veins of the famous Cloverport cannel coal, now worked by the Breckinridge Co., are only 18 in. to 2½ ft. thick, and the coal is no better in quality than the new. If the latter holds out according to the outcroppings, it will be the richest cannel coal mine in the world and one of the most important discoveries of mineral wealth ever made in Kentucky."

#### Smoke-Preventing Device.

The mechanical department of the East Tennessee, Virginia & Georgia is said to be experimenting with a new smoke-preventing device for locomotives. They use table grates with diagonal slots or openings ½ by 3 in., and 34 such openings in each grate. The grate next to the fire-box door is made stationary, and a back is cast upon it which is slotted. The back damper is kept shut and the front one open when running. The air passes in over the back dead grate and gets partly heated before reaching the fire, the supply by that opening being provided to make up for the restricted supply that passes through the contracted grate openings. The arrangement works well as a smoke-preventer and saves fuel, the narrow openings in the grates preventing the waste of coal that is usually caused by the fine coal falling into the ash-pan.

#### A Lake Michigan Steamer.

The steamship William H. Wolf, launched last Saturday at Milwaukee, is the largest vessel ever built on Lake Michigan. She is 308 ft. over all, 39 ft. beam at the bilge, 42 ft. on deck and 22 ft. hold. She is expected to carry 90,000 bushels of wheat or 2,000 gross tons of ore. Her engine is a triple expansion of 42 in. stroke, with cylinders 20, 32 and 54 in. in diameter. Her boilers are of Scotch pattern, 10½ ft. in diameter and 11½ ft. long, and are of one inch steel. She will be ready about Sept. 1. Her cost is \$150,000. She is owned by her builders, Wolf & Davidson. During the launching of the steamer, a shed on which hundreds of spectators were standing suddenly collapsed. Three persons were instantly killed and a number fatally injured.

#### Railroad Editors.

The Connecticut railroads now employ editors on their staffs of officials. They are called advertising agents. Isaac Bromley, Jr., fills the position in the Consolidated road and Col. Graves, formerly of the Hartford Telegram, edits the

Housatonic and other Starbuck properties. They take charge of the advertising business proper and promote the interests of their companies through and with the newspapers in every way possible. It used to be said in Boston that the New England was the best edited road in the country. It promises to have rivals for the distinction in Connecticut.—Springfield Republican.

#### Petroleum Fuel.

In the June number of the consular reports issued by the Department of State appears a paper, by Mr. James P. Chambers, United States Consular Agent at Batoum, in Southern Russia, on the subject of petroleum fuel. The article is a translation from an exhaustive report upon the subject by Mr. F. V. Urquhart. From this paper it appears that the Trans-Caspian, Trans-Caucasian, Tarnob-Saratoff and the Griazi-Tsaritzin railroads now use petroleum fuel exclusively, the last named in 143 locomotives and under 50 stationary boilers. The comparative cost of anthracite coal and oil is found to be:

Coal consumed per mile, 1882	Lbs.	87
Petroleum consumed per mile, 1885	49—	
Saving in weight		43.68 per cent.
Cost of coal per mile, 1882	Cts.	23
Cost of petroleum per mile, 1885	13—	
Saving in cost		43.13 per cent.

Mr. A. Hess, Secretary of the Cincinnati Spring Works, is quoted in the *Iron Trade Review* as follows: "The result of our experience in the use of crude oil in our heating furnaces is highly satisfactory both as regards the economy over coal and in effect. Its advantages over coal are numerous. For instance, we can produce any desired heat and hold it uniformly with no further attention after starting. By heating our work quickly we avoid all tendency of scaling or pitting the steel, which is quite important in this business. We have just applied it to our open forges, such as are generally heated with hard coal or coke, and we are able to make even better economy than in our ovens. We are so well pleased all round that we could not be induced to discontinue its use, and shall lose no opportunity of giving it the praise it so justly deserves."

Mr. Alexander DeLano, President of the Detroit Steel & Spring Works, says: "We are so well pleased with crude petroleum for fuel that we have put in tanks, pumps, pipes, etc., in a permanent manner, and think it will be the fuel of our business for the future."

Mr. R. A. Catanach, Treasurer of the Pennsylvania Lime & Fluxing Stone Co., writes from Philadelphia: "On a trial of thirty hours we found we could burn lime at a cost of 3½ cents per bushel with oil as compared with 7 cents per bushel, the former cost in the same kiln when wood was used; 960 gallons of oil burnt 710 bushels of lime. The kiln had 8 burners, which shows about 4 gallons per hour to each burner."

Oil has been used for three years in burning lime in the Acme Lime Co.'s kilns at Baker Station, Pa., and President R. H. Hepburn says that he is entirely satisfied with the results.

#### The Blaine Dump Car.

The Blaine Car & Manufacturing Co. sends us the following certificate from the Master Mechanic of the Montana Union Railway Co., addressed to his President: "We loaded six of the standard car dumps (Blaine patent), this afternoon, to run to Anaconda smelter for trial; cars averaged 22 tons to the car. We dumped the six cars in ten minutes without any trouble. I think the cars will work satisfactorily." It is added that the dumping was done by one man passing from car to car.

#### North Chicago Rolling Mill Company.

The annual meeting of the North Chicago Rolling Mill Company was held at their office in Chicago, July 25. Five million three hundred and forty-two thousand six hundred dollars of the \$6,000,000 of stock was represented. The reports of the officers show the gross earnings for their fiscal year ending July, 1887, to have been over 14 millions of dollars; and the manufactured materials to have been nearly one million of gross tons, being an increase of 31 per cent. over the preceding year, aggregating in gross tons:

Pig metal	303,915
Steel ingots	309,918
Steel rails	256,897
Merchant sizes of iron and steel	88,616
	958,446

Raw materials used: Coal	272,000
Coke	369,000
Iron ore	525,000
Limestone	115,000
Spiegelisen	24,000

The number of men employed averaged 5,700.

Directors elected for the coming year were Nathaniel Thayer, of Boston; Richard C. Hannah, of Chicago, and Orrin W. Potter, of Chicago.

The officers elected were: Orrin W. Potter, President; Richard C. Hannah, Secretary; John C. Parkes, General Manager.

The operations of this company are carried on in three distinct plants. The largest of these is the South Chicago plant, consisting of blast furnaces, Bessemer steel works and steel rail mill, located in South Chicago. Next in importance is the North Chicago plant, also consisting of blast furnaces, Bessemer steel works and steel rail mill, situated in the north-western part of Chicago. The third plant is composed of blast furnaces, rolling mills and a nail factory at Milwaukee. The company paid out over \$2,500,000 to transportation companies for freight in the last fiscal year.

#### Railroad Economies.

It is stated that the London & Northwestern Co. grow their own osters, manufacture and repair their own meat and poultry hampers, wash the meat cloths, and from the grease and fat extracted make a quantity of soap which is supplied to their stations.

#### An Immense Bronze.

The largest bronze casting ever attempted in America was made at E. Favy's works, on Forsyth street, yesterday. It is the mammoth buffalo head designed by Kemeys, the sculptor, for the east portal of the new Union Pacific bridge across the Missouri at Omaha. The head measures 9 by 5 ft. The box containing the sand and plaster mold was 22 by 22 by 26 ft. Some 4,500 pounds of molten bronze was poured into it. Some of the bronze manufacturers had said such a huge casting could not be made at all, so Mr. Favy received many hearty congratulations from the representatives of various bronze casters who had gathered to witness his experiment. Three small crucibles of molten metal were first poured into the mold. The gas vents in the mold were lighted, the fiery stream from the big crucible was started, and in three minutes the casting was a success, so far as any one can tell until the molds are removed on Saturday. A firm of electrotypers has undertaken to make a reproduction from the cast, and if successful this will be an even more remarkable mechanical achievement than the bronze casting.—New York Times, Aug. 10.





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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

So great an interest centres now about the western end of Lake Superior, and the results of the development of the newer mines there promise to be so far-reaching, that we are glad to be able to give a synopsis of the report made by the *Iron Age* of what the American Institute of Mining Engineers saw there. The additions made to railroad and lake traffic by the opening of the Vermillion and Gogebic mines and the consequent activity in building of railroads and lake craft have been the present and visible results but more important results will be the influence of these mines on the iron and steel industry of the country. The *Iron Age* thinks "it must be clear to every one who has even hastily examined the new districts, that for years to come the question of a full ore supply is secured to the entire iron and steel industry west of the Allegheny Mountains;" and they certainly have gone far toward making us independent of foreign sources of supply, not only for ore but for rails. It is estimated that the shipments from the Vermillion mines from May to November this year will reach 400,000 tons, and the probable output of the Gogebic mines has been estimated at 1,250,000 tons for the year. The 1886 product of the Marquette and Menominee districts was 2,502,000 tons. It will be seen that the contribution of the new districts places them among the "sources of supply of the first magnitude."

The review in another column of the state of the engineering trades in England will be found interesting. It suggests again the growing independence of the United States in iron and steel products; but it is well for our rail makers to consider the statement that in respect to quality some of the American railroad engineers consider that they can get better value in England than at home. Our passing reports of the condition of locomotive building in England are confirmed. Prices are unremunerative and the prospects of improvement are not good. Bridge builders are busy but at very low prices. It is suggested that the time is not far distant when the Canadian bridges will have to be rebuilt, but the American and Canadian builders will no doubt see that the contracts do not go across the Atlantic.

Although every superintendent is not a telegraph operator, nearly or quite every one has an operator at his elbow and has frequent occasion to think swear words, both on his own account and by reason of his sympathy with the operator, when unaccountable interruptions of communication occur and when the "plugs" who adorn the way stations step out for a few hours' fresh air breathing after leaving a key open. A device, therefore, which will mitigate the annoyances connected with wire-working is sure of receiving the attention of a large share of the readers of the *Railroad Gazette*. An old and observing railroad superintendent said the other day that not one of the wires running into his office, whether telegraph, telephone, electric light, or fire-alarm could be worked a

single day without trouble from interruption of some sort. This must be susceptible of improvement, and a means tending to that end is described in another column of this issue. To one accustomed to nothing but simple Morse circuits, this apparatus may seem complicated, but electrical experts nowadays reduce all sorts of complicated devices to simple and workable forms, and experienced men in that line look with favor on this invention.

The American enterprises in China do not diminish in grandeur. A Shanghai dispatch of the 8th inst. states that special envoys have sailed for Washington having the imperial sanction for the establishment of a bank under an American-Chinese direction, with Li Hung Chang at the head. It is added, in an off-hand way, that the first enterprise will be a railroad from Peking and Tien-Tsien to Canton. The distance in an air line is about 2,000 miles. It is not easy to find out the precise meaning of all these rumors, but it seems pretty certain that an American syndicate has secured certain rights or privileges. That American money, enterprise and skill may take a first place in the new industrial life of China, when it begins, is greatly to be hoped, for the good of China as well as for our own profit. China should be spared the cost of English and continental methods, and kept from any policy that will increase European influence in the country. But it must be admitted that the treatment which the Chinese in this country have received in late years at the hands of our government and citizens is not calculated to smooth the way.

The good time made by the Canadian Pacific in carrying a large shipment of domestics from Massachusetts to the Pacific Ocean illustrates the advantage possessed by a line which has the fewest possible transfers of engines and other delays; and also illustrates the fact that roads with a light traffic often can beat a heavy trunk line simply because the management of cars and trains is in some respects more carefully looked after and kept in hand. Detentions for repairs on a crowded freight line are so numerous—apparently if not really—that generally only the most alert vigilance suffices to shorten them and rush the cars through; while on a smaller road such a matter as a hot box receives the personal attention of a conductor or some intelligent employé, who will remedy the matter in the shortest practicable time.

A customer of the Boston & Maine has appealed to the Massachusetts commissioners against the practice of the road in collecting fare from passengers holding mileage tickets under the usual conditions, over portions of the road in excess of the actual distance traveled. It appears that the company has charged "constructive mileage" to compensate for some real or alleged inequality in the quality or cost of the service. The commission decides that the practice must be stopped. It is of course often right to charge different rates over different divisions of the same road though it is well settled that distinctions of this sort must not be carried to too fine a point; to charge two cents a mile where the road has cost \$20,000 per mile, and raise it to three cents where the cost was five or ten times that amount would have a certain basis in reason; but the legislatures and courts have decided, and wisely, that a road constructed for the public benefit must take broader views and charge no more per mile for carrying a passenger through a twenty million dollar tunnel than for the same distance over a mud-ballasted prairie track. Constructive mileage may pass muster on competitive freight traffic where any inequality or injustice can be settled between contending roads who both know all the particulars and can discuss the questions on an equal footing, but in dealing with individual passengers a carrier's duty is to have all conditions plain and simple. Some of the bridges where the mileage shown on the time tables represents more nearly the lineal dimensions of iron work in the trusses than it does the actual length of track may come in for a judicial decision on this point some day.

#### The Economy of the Compound Locomotive.

The particulars which we give on another page of the economy of the working of a heavy train by one of Mr. Webb's compound express engines are very interesting. The train was purposely run at a low speed in order to ascertain the difference in consumption of fuel between running at a high and running at a low speed. The result was that doubling the speed from 25 to 50 miles an hour doubled the consumption of coal. This ratio differs considerably from the results obtained from a similar experiment on the Philadelphia & Reading with, however, a very

much lighter and shorter train.\* The consumption at 50 miles an hour was there only 50 per cent. in excess of that at 12½ miles an hour; that is to say, a fourfold increase of speed only increased the consumption 50 per cent., whereas with Mr. Webb's train doubling the speed doubled the consumption. The consumption per ton gross weight of train was only 1½ oz. per ton at a speed of 24 miles per hour, including stoppages. This is about the lowest consumption for a passenger train on record, and is much below that of other engines. It must, however, be borne in mind that, as Mr. Webb's train was very much the heavier, a lower consumption per ton might be anticipated; but not only is this the case, but the actual consumption is less. That is to say, the London & Northwestern compound ran at double the speed of the Philadelphia & Reading Wootton engine and hauled a train more than twice as heavy on two-thirds the consumption of fuel. This is pretty strong testimony to the great economy of the compound system and the great expansion obtained, as shown in the indicator diagrams, explains why this economy is obtainable.

The economy of the compound locomotive is especially felt in starting heavy trains. Mr. Webb's engine has two 14 in. high pressure cylinders and weighs 96,000 lbs. An ordinary locomotive of this weight would have a pair of 18 in. cylinders. The result of this difference is obvious. The consumption of steam in starting may be gauged by the areas of the cylinders, which vary as the squares of their diameters, or as 196 to 324. Consequently, when the two engines are starting the non-compound engine is practically using 324 cubic inches of steam to the 196 inches used by the compound engine. In other words, in starting under full gear the runner of an ordinary locomotive can use about 1.65 times more steam per revolution than the runner of the compound engine. The compound engine, therefore, will use about three-fifths of the steam used by the ordinary engine. The total weight of the engines differs very little, and the size of the boilers may be assumed to be precisely the same. In the compound engine the boiler not having to produce so much steam is not so severely taxed, and therefore it is worked more economically. These considerations show that in a compound locomotive the steam can first of all be produced with greater ease and therefore more economically, and further, when produced it can be used to greater advantage and more work got out of the same quantity of steam. Under these circumstances the economy obtained by compound engines is not astonishing, as it is the obvious corollary of conditions inherent in a properly designed compound locomotive.

It may, however, be objected that a compound locomotive in which, as in Mr. Webb's system, no high pressure steam can pass direct from the boiler to the low pressure cylinder, has to depend wholly on a small cylinder for starting the train. This is correct, but it may be pointed out that the experiments at Burlington have shown conclusively that the greatest power in starting a heavy train is not required during the first revolution of the wheels of the locomotive, but after the engine has gone some 40 to 70 ft. These conditions admirably suit the compound engine. At the moment of starting it depends solely on the full steam pressure on the high pressure pistons, which, however, for the first stroke have no back pressure against them, but after a complete revolution has taken place, the low pressure cylinders also help to propel the engine. Therefore, while a compound engine cannot, like an ordinary locomotive, exert its full tractive force at the moment of starting, it can, unlike an ordinary locomotive, exert its greatest force after it has traveled some 15 or 20 ft. The experiments at Burlington have shown that this is exactly what is required of a locomotive, which, when starting a heavy train on a grade, is generally stalled after it has succeeded in putting the whole train in motion. The experiments also showed that the difference in tractive force required at the moment of starting and after having run some 50 ft. to 70 ft. is measured by quite a considerable number of cars.

#### The Chicago & Northwestern Report.

The increase in mileage of the lines owned and operated by the Chicago & Northwestern in the fiscal year ending May 31, 1887, was 153 miles, making the total 4,101. The average length operated the entire year was 4,037 miles.

There was no change in the capital stock of the company, but the general balance sheet has been reduced \$10,526,217, by writing off that amount from the nominal value of the stocks of proprietary com-

\* These particulars were given in the *Railroad Gazette* on page 298, April 18, 1884.



panies, which have heretofore been carried at over \$11,000,000. These stocks are now estimated at their value with reference to cost. Moreover, \$10,000,000 from the credit balance of the income account of May 31, 1886, has been transferred to "cost of road" on account of net income expended in repairs and betterments in previous years and not capitalized. The self-restraint of a management which has chosen to thus cut off \$21,000,000 of nominal assets, instead of inflating its stock, is as admirable as it is unusual.

The funded debt was increased \$6,873,000. This was from the issue of \$8,147,000, 4 per cent. "extension bonds of 1886," of which \$2,375,000 was used in construction of various extensions embraced in the system operated, and the interest is borne in the interest account of the company. The remaining \$5,772,000 of this issue was applied to extension and construction of the Fremont, Elkhorn & Missouri Valley and the Wyoming Central, and the interest is paid by the former road. The bonds retired and cancelled were chiefly \$1,274,000 Winona & St. Peter first mortgage, 7 per cents.

The gross earnings have increased over last year \$2,041,716, or 8.4 per cent., and the net earnings \$840,600, or 8.0 per cent. For six years the operations per mile have been:

	Gross earnings per mile.	Ex. and taxes per mile.	Net earnings per mile.	Interest, sinking funds and rentals.
1882.....	\$7,809.24	\$4,167.51	\$3,641.73	\$38.74
1883.....	6,930.63	4,061.69	2,868.94	431.80
1884.....	6,726.73	4,070.61	2,656.12	254.88
1885.....	6,153.39	3,611.57	2,541.82	99.79
1886.....	6,239.22	3,561.46	2,677.76	72.08
1887.....	6,519.65	3,732.84	2,786.81	145.78

Aver. for 6 yrs. \$6,733.14 \$3,807.61 \$2,865.56 232.18

The results for six years ending May 31, 1887, have been:

Year ending May 31.	Average miles operated.	Gross earnings.	Net earnings.	Interest, sinking funds and rentals.
1882.....	3,032.90	\$23,684,656.19	\$11,045,022.08	\$5,666,946.94
1883.....	3,474.70	24,081,834.32	10,009,317.96	5,557,701.32
1884.....	3,719.58	25,020,624.16	9,879,667.04	6,178,939.24
1885.....	3,819.37	23,502,055.56	9,708,145.51	5,151,101.01
1886.....	3,891.45	24,279,599.74	10,410,373.78	5,594,362.92
1887.....	4,037.23	26,321,315.15	11,250,973.38	5,194,197.61

These tables are sufficient to indicate the great earning power of the system and emphasize what we have said before as to the important change made by the management in the balance sheet.

As will be seen by reference to the abstract of the annual report published on another page the increased earnings are due to increased business alone, for rates, both passenger and freight, were less than the year before, and the expenses per mile were greater. In fact the rates per ton per mile and per passenger per mile were the lowest for 14 years. The rate per ton per mile was 80 per cent. less than the average for 14 years and per passenger per mile 27 per cent. less; but the ton miles were larger than ever before, and the passenger miles were exceeded only in 1884.

The maintenance expenses for six years have been:

Year to May 31.	Road.	Structures.	Cars.	Loco-motives.	Total.
1882.....	\$2,518.30	\$1,053,099	\$863,388	\$85,005	\$5,300,570
1883.....	2,278,839	1,094,156	1,303,632	928,468	5,605,095
1884.....	2,618,427	1,491,491	1,491,631	957,575	6,040,024
1885.....	2,196,821	742,430	1,269,036	924,188	5,132,476
1886.....	2,214,764	772,191	1,328,095	891,116	5,206,166
1887.....	2,399,335	837,911	1,264,518	947,771	5,449,535

All items of maintenance have increased except repairs and renewals of cars. The mileage in steel rails now amounts to 85.53 per cent. of the whole, and the tons of new steel rails laid has been:

Year.	1881-2.	1882-3.	1883-4.	1884-5.	1885-6.	1886-7.
23,414	11,154	19,980	9,939	16,701	14,319	

The net cost of all rails laid the last fiscal year, after crediting the value of those taken up, was \$229,931.

Last year the cost of rail renewals was to that of ties as 1 to 1.51, and this year it is as 1 to 1.58. The cost of labor for laying rails was \$2.71 per ton, and for laying ties 15.3 cents per tie. Angle bars cost \$49,239; spikes, \$30,850; bolts, \$12,870; nut locks, \$5,043, and ballast, \$17,057, in the maintenance of 4,037 miles of road.

The trans-Missouri lines are not included in the operations and results considered above. To them has been added 297 miles the last year, making a total of 907 miles to May 31, or an average operated for the entire year of 820 miles.

Of these, the Sioux City & Pacific, operating 107 miles, made gross earnings of \$559,863, paid \$243,000 in interest and guaranteed dividends, and reduced the debit balance of the income account by \$52,000. The Fremont, Elkhorn & Missouri Valley, on 713 miles operated, earned a surplus of \$654,876. The gross earnings were \$2,662,733, operating expenses \$1,276,182, and interest on bonds \$644,233.

Further extensions of the latter road are in progress to the amount of 371 miles, bonds being issued as the

lines are built and transferred to the Northwestern in exchange for its extension bonds. The new construction is mostly in Eastern Nebraska, only some 80 miles being extension into undeveloped country.

#### Mexican Exports.

The Mexican *Financier* reproduces the treasury report of Mexican exports, showing the average exports for the five years ending with 1885 and for the fiscal year 1885 and 1886, to which is added the percentage of increase and decrease.

	Annual average for five years.	Fiscal year 1885-6.	Percentage of increase or decrease.
	Tons.	Tons.	
Indigo.....	55	71	29
Coffee.....	8,090	8,386	4
Sugar.....	2,092	2,833	35
India Rubber.....	119	130	9
Bristles.....	123	153	24
Beans.....	1,143	723	-36
Peas.....	171	146	-15
Cochineal.....	25	37	48
Hueguin.....	34,632	40,507	17
Bones.....	383	2,561	490
Tequila.....	4,010	5,046	25
Wool.....	339	2,326	586
Furniture woods.....	55,017	54,198	-2
Dye woods.....	36,076	37,118	3
Other.....	12,560	8,830	-30
Honey.....	1,056	761	-28
Orchilla.....	886	990	12
Goat skins.....	3,358	4,157	23
Goat.....	1,040	1,601	53
Deer.....	187	204	9
Piloncillo.....	468	465	-1
Lacaton root.....	649	1,681	159
Manufactured tobacco.....	118	128	8
Leaf tobacco.....	254	418	65
Vanilla.....	50	44	-10
Sarsaparilla.....	309	735	138

The London *Economist*, discussing the probable success of ex-Treasurer Jordan's effort to transfer the control of the world's silver market to this city, gives the following estimate of the production of silver, as made by Dr. Kimball, of the Philadelphia Mint:

United States.....	\$10,320,000
Mexico.....	6,420,000
Bolivia.....	3,200,000
Chile.....	1,330,000
Peru.....	400,000
Other South American states.....	240,000
Germany.....	1,920,000
Austria-Hungary.....	410,000
Russia.....	130,000
Other European countries.....	230,000
Australasia.....	210,000
Japan.....	190,000

It is argued that as the sum of the Mexican and South American production exceeds that of the United States (by some 12 per cent.), and as India will continue to be the great market for silver, an institution in London to deal in silver would be more likely to succeed than one in New York. But that England will control the trade of Mexico, and hence the product of her silver mines, is an assumption that is hardly fair. However the South American trade may go, that of Mexico will probably be mostly divided between the United States and Germany, with a constantly increasing share to this country as our railroads are extended and as the Gulf States turn their attention from agriculture to commerce and manufacturing.

The drouth in the West continues very serious. The signal office reports injurious deficiency of rain in the states north of the Ohio valley, and the daily newspaper reports present a pitiful state of things in a large area of the Northwest. Forest fires and destruction of buildings, fences and crops from fires set by locomotives are of frequent occurrence, and stock is reported suffering in various regions. A report has gone about that the Illinois Central is so troubled for want of water for engines that some of its trains may be taken off. As we go to press news comes of heavy rains in the Northwest.

The effect, however, of the drouth on the corn crop cannot yet be estimated. The reports are very conflicting. The crop has unquestionably suffered in certain sections, but, on the other hand, timely rains in other regions have saved a great amount of late corn. Statistics gathered by the Kansas City, Fort Scott & Gulf indicated about two-thirds of an average crop, but these were gathered before the recent rains in Kansas. The Department of Agriculture reports a heavy reduction in condition in the Ohio and Missouri valleys. In the seven corn surplus states the condition is reported as follows: Ohio, 83; Indiana, 64; Illinois, 65; Iowa, 90; Missouri, 80; Kansas, 60; Nebraska, 75.

The Signal Office reports an increased rainfall in the cotton region, largely making up for the "seasonal deficiency" existing before. It is even said that in the lowlands the crop may be injured by excess of rain.

A San Francisco dispatch says: "A large excursion party, consisting of seven Pullmans, arrived on Tuesday evening by the Central overland. There were about 109 excursionists, many of whom will visit Oregon and Washington Territory. The spotters were about the scalpers' offices to-day, watching the people coming and going, in order to settle their identity when they should present themselves at the office of the Southern Pacific Company to have their tickets stamped for return passage. It is evident that the Southern Pacific is devoting a good deal of time, money and attention to the scalpers, and especially to Adolph Ottinger, who has made so much legal difficulty for the company of late, and who will probably be dislodged if it is in the power of the railroad people to do so. The loss of his \$900 worth of tickets, all of which have been cancelled by the Southern Pacific, has not discouraged Ottinger in the least."

The contention would seem to be getting lively on the Pacific coast. Cheap round trip tickets are such a temptation to people who really ought to pay regular fare that the roads may find themselves obliged, for self-protection, to put each passenger in a glass case and keep him there during

his sojourn on the coast, or at least to brand each one with a hot iron; such weak devices as the punch-photograph seem to be futile.

In Illinois the Railroad Commissioners have now the duty, according to a law passed by the last Legislature, of investigating fatal and other serious accidents, the same as is done in Massachusetts, New York and other states. Recent fatalities at grade crossings in Chicago have occasioned action on the part of a Citizens' Association which is urging the city government to require better protection at street crossings. It is claimed that old and decrepit men who are inefficient are employed to watch crossings and tend gates. Any grade crossing which is not provided with a strong barrier needs an attendant who is able-bodied in lungs at least, and strong in will; for careless people have constantly to be shouted at in the most vigorous manner. And any crossing where trains are at all numerous, demands a person of alert faculties who will not be caught napping when unexpected trains approach.

In our issue of July 1 the fact was mentioned that the Moss Bay Hematite Iron & Steel Co., of Worthington, Eng., intends to erect new works in Washington Territory. A recent issue of *Iron* states that purchases have been made, rights and royalties secured, and the capital is being subscribed privately, and that the new works will "soon become hard and substantial facts." The same authority says that the works are to be near Seattle, and about 16 miles from the Northern Pacific. Excellent coking coal and rich ore are found near each other, and it is expected that the new works will be strong competitors with the English works as well as with others in the United States in the steel rail market.

In a report on the collision (with buffer stops) at Battersby, on the Northeastern Railway, Major-General Hutchinson, of the British board of trade, says:—"Unless the rule for running into stations with block ends is made absolute in prohibiting the use of continuous brakes—except in cases of emergency—and drivers are severely punished when they transgress it, such collisions as the present will be certain to recur from time to time." American officers who are in doubt as to the safest method of making crossing stops have here an expert English opinion on a case involving similar principles.

The Burlington & Missouri River has, it is said, determined to refuse transcontinental freight at the prevailing low rates, in order to appease their local customers who complain at the great differences between the local and through rates; and it is stated in connection that the California business amounts to only one or two carloads a day. This is one more illustration of the great amount of talk there is over a very small matter.

The Time Convention committee has asked that all criticisms or proposed amendments to the telegraph rules be sent them at once, so that there may be ample time for their consideration before the fall meeting.

#### Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887 is given in the current number of the *Railroad Gazette* as follows:

*Beach Creek*, reports since Jan. 1 4.31 miles of coal and lumber branches.

*Central Missouri*, 5 miles, from St. Charles, Mo.

*Cincinnati, Hamilton & Dayton*.—Troy branch, Troy north 16 miles, and south on Piqua branch from Piqua 2 miles.

*Cleaveland & Jefferson*.—Mahaffy to McGees 2½ miles; branch, Irvona to coke ovens, 3 miles.

*Cleveland, Akron & Columbus*.—Dresden branch, 1 mile south of Killbuck to Langlands, 4.3 miles.

*Minneapolis, Sault Ste. Marie & Atlantic*, laid this season 70 miles.

*Phoenix*, north from Phoenix, Pa., 3 miles.

*Rome & Decatur*, between Rome & Atalla, 30 miles.

*St. Louis & Chicago*, Litchfield, Ill., to Mount Olive, 9 miles.

This is a total of 135 miles for the week, making 2,777 miles reported thus far for the current year. The new track reported to the corresponding date for 16 years has been:

Miles.	1887.	1883.	1879.	1875.	1871.
1887.....	2,777	2,942	1,346	1,005	807
1886.....	2,311	2,782	1,278	1,005	916
1885.....	1,377	3,180	1,877	943	2,028
1884.....	1,905	2,704	1,231	1,872	3,487

This statement covers main track only, second or other additional tracks and sidings not being counted.

#### NEW PUBLICATIONS.

*A Method of Calculating the Cubic Contents of Excavations and Embankments by the Aid of Diagrams.* By John C. Trautwine, C. E. Ninth edition, revised and enlarged, by John C. Trautwine, Jr., C. E. John Wiley & Sons, New York. 72 pp. and 10 plates. Price, \$2.

This is the first revised edition of the "Excavations and Embankments" which has appeared since 1883. But little change has been made in the subject matter. Remarks on the operation of steam excavators and rules for estimating the cost of moving earth by wheeled and drag scrapers, and by locomotive and cars have been added. A new method of constructing tables of level cutting suggested by Mr. John Hudson, C. E., has been incorporated in the present edition.

*The Field Practice of Laying Out Circular Curves for Railroads.* By John C. Trautwine, C. E. Thirteenth edition. John Wiley & Sons, New York. Price, \$2.50. Appended to the preface of the n'th edition of "Curves"



was this characteristic note, by the elder Trautwine: "Errata—Believed to be none." That being the case, subsequent editions would naturally differ from each other only in gathering more material. But as the original purpose and reason of this little treatise was to make it a field book of practice in running curves, there was a physical limit to its size. The present edition, therefore, is but slightly changed.

#### TRADE CATALOGUES.

*Catalogue of Rock Drills, Air-Compressors and Air-Receivers, Engines and Mining and Quarrying Machinery.* Ingersoll Rock Drill Co., New York.

"This catalogue is particularly intended for the use of mining men, engineers and others interested in underground work. For quarrymen, general contractors and others engaged in surface rock excavation we publish a special catalogue of rock drills and quarrying machinery."

This pamphlet of over 100 pages is a catalogue of drills, compressors, plant and fixtures, and it is besides that a handbook of considerable value to those who have occasion to buy or use the material of which it treats. That is, besides the usual "claims" and unqualified assertions of superiority thought necessary in a trade catalogue, it contains many facts about the construction, sizes and performance of drills, compressors, boilers, engines and hoisting engines. There are tables also of data on compressed air; of facts about hoisting ropes and various other matters. Much really good information is scattered through the letters from users of the Ingersoll plant, and naturally it is information which is not to be found elsewhere collected. Most of the letters have done duty, however, in a former catalogue. One correspondent, having complained of trouble caused by water delivered with the air to the drills, got the following hints which may be useful to others:

Our plain receiver is merely a tank with inlet and outlet pipes, the inlet pipe going to a point a few inches from the bottom of the receiver. This plain receiver is placed upright. Our condensing receiver is usually placed in a horizontal position, and has internal condensing tubes around which cold water circulates; these internal tubes are put into the receiver, which looks like a tubular boiler, the purpose of the cold water circulating around the tubes being to cool down the air and cause it to deposit its moisture in the receiver. If you have not got this condensing receiver, you can make a condensing receiver out of your plain one in the following way (this is a patented process and will cost \$15 for the privilege of using it). We grant this privilege upon application: Take a small pump and force cold water inside the receiver, keeping it at a level, about two feet from the bottom of the receiver and letting it out as fast as it is put in. The air-pipe should come below the surface of this cold water, and in this way the air coming over from the compressor with water and slightly increased in temperature will deposit its water in the receiver and go into the mine absolutely dry. A simple illustration of this system of condensing is seen when you take a pipe through which steam is passing and put the end of it below a surface of cold water. You have probably done this and noticed that the water will increase rapidly in temperature and that no steam will escape from it, as long as the water is kept cold. This is precisely what takes place in the receiver; as long as the water there is cool there will be no escaping. We also have a trap which may be attached to the receiver, which will drain the water automatically, keeping it at any definite level that you may desire. This trap is made on the principle of a regular steam-trap, such as is used for draining regular steam pipes. If you will observe these points, you will have no difficulty with wet air.

The following concerning radiation from steam pipes is also of interest:

A test to ascertain the loss of heat from uncovered steam pipes and those covered with different coverings was conducted by L. A. Upson, Superintendent, and Chief Engineer Steele of the Hartford Carpet Co., with the following results: A room having a very even temperature and free from draughts or air currents was selected, close to the boilers, where steam could be taken from the top of the main pipe, and free from water of condensation. A suitable vessel was arranged to collect the water of condensation, and connected to 120 running feet of 2-in. steam-pipe. A short section of the pipe was inclosed in a suitable box, with a glass in the side for the purpose of reading the rise of temperature, as indicated by a thermometer placed therein. Steam was first blown through the pipe and receiver, until both were free from the water of condensation, which was caused by heating the pipe and receiver. The valve was then closed and 10 hour trials made, the water carefully collected and weighed, with the following results:

Each trial as given below was for ten hours, 120 ft. of 2-in. pipe, No. 1 pipe uncovered, No. 2 pipe covered with asbestos, hair, felt and paper, No. 3 pipe covered with plastic material.

	No. 1.	No. 2.	No. 3.
Average steam pressure	79	77	80 lbs.
Average temperature of room	70	69	70 deg.
Average temperature of box	137	89	107 deg.
Water condensed	802	222	480 lbs.

It will be seen from the above that the loss by radiation greatly exceeds that usually estimated for uncovered pipes, but it agrees very well with trials made upon machines carrying high steam pressures. The saving by covering the pipes is very satisfactory.

#### THE SCRAP HEAP.

##### Train Telegraphy in a New Role.

Mechanical appliances are constantly being invented to take the place of human power. A patent has recently been granted for an "electrical conductor for railway trains." Whether such a conductor will possess greater ability to "knock down" than the human kind must depend, we suppose, upon the amount of the charge. How the machine is to punch tickets is not stated, but the information is vouchsafed that the "truss rods of the cars are made the electrical conductors." Conductors have long been known as men of iron. It is possible, however, that the human kind are to be restricted but not dispensed with altogether, as it is further provided that "the conductor is made continuous by connecting the ends of said rods with short conductors." Tall conductors, it may therefore be supposed, will be at a discount.—*Official Guide.*

The writer of this evidently did not discern that the invention is an induction apparatus. Probably it induces the passengers to settle without any punching.

##### Southern Enthusiasm.

General John H. Rice reports at Natchez, Miss., that the enthusiasm along the line of the proposed New Orleans, Natchez & Fort Scott Railroad, which he is championing, is absolutely boundless. It will have to be dampened with a

wet blanket, or something; possibly a blanket mortgage would be kindly lent by some road that is "older and knows more." General Rice made a trip through the country and attended barbecues innumerable, at which were roasted oxen by the carload. (Carload is figurative; the cars in which to load the beehives have not yet appeared in these towns.) And yet after dining off twenty fat steers the General and his associates actually made speeches. Some of the meetings were addressed by captains, professors, ex-governors, generals, majors, and no end of colonels at Hot Springs Ark., the enthusiasm is (naturally) at the boiling point, and the people have given the right of way, guaranteeing it against wash-outs in case the Springs happen to boil over. All along the line, rights of way, timber lands and depot grounds are so freely offered that the road is likely to be embarrassed with riches, and, says the General in closing, the people are ready to sign away anything they possess. Front-door-yards are offered for gravel pits, and wash-tubs are tendered for tank houses.

##### The Railroad German.

A new figure of the German requires six railroad tickets for the ladies, six placards for the gentlemen and a whistle for the leader. The gentlemen fasten the placards around their necks, while the tickets are distributed among the ladies. Upon the signal from the leader the orchestra plays a railroad gallop, and the gentlemen march into the room imitating a train. No brains are required. The onlookers are advised to take pepsin.—*Puck.*

##### Buffalo Bill on the Union Pacific.

The Union Pacific seems to be having some dealings with Buffalo Bill; at least we read that a New York party is making for it a mammoth bronze buffalo, for which the bill will doubtless be of a size worth noticing. Perhaps this accounts for the retrenchment reported in the Union Pacific offices.

##### Grade Crossings in Buffalo.

The question of the abolition of the very numerous street crossings in Buffalo is still under lively discussion in that city. The state commissioners have sent Special Inspector Spencer there to make a report, and will give a public hearing on the matter at Albany, Sept. 13.

##### Securities Listed at the New York Stock Exchange.

Duluth & Manitoba, \$1,650,000 first mortgage sinking fund 6 per cent. gold bonds. Northern Pacific Railroad, \$4,460,821 dividend scrip and dividend scrip extended. Engraved certificates of \$500 and \$1,000 only will be a good delivery. Keokuk & Western, \$4,000,000 common stock. Central Pacific, \$12,000,000 bonds, to be known as the "Central Pacific mortgage bonds of 1896." Minneapolis, Sault Ste. Marie & Atlantic, \$2,730,000 first mortgage 5 per cent. 40-year gold bonds; \$2,426,000 common stock and \$2,426,000 preferred stock. Central of Georgia, \$5,000,000 collateral trust 5 per cent. 50-year gold bonds.

##### Protection From the Train Boy.

"The peanut boy is a feature on Russian railroads, too," observed Squidgie. "How do you know?" asked McSwilligen. "Because the papers say that the Czar always has fifty thousand soldiers guarding him when he travels by rail."—*Western Paper.*

##### Moving a Town.

An exchange says that the town of Dayton, Col., comprising about one hundred business and dwelling houses, will be moved two miles north of its present location in order to communicate with the Denver, Memphis & Atlantic Railroad.

##### South American Railroads.

The Argentine Republic has in operation a line of railroad some 800 to 1,000 miles in length, running from the Atlantic to the eastern border of Chili. The Chilean government has recently subsidized a company to construct 140 miles of railroad needed to complete the gap between the existing Chilean and Argentine systems. Thus the completion of the South American transcontinental line is assured.

##### Henpecked.

"The funniest thing I ever run across in ten years happened yesterday," said my friend the ticket agent. "A young man came to the window and bought a ten-ride family ticket. After paying for it he asked me to punch out seven rides. I didn't exactly understand what he wanted and told him the conductor would attend to that all right enough. He then explained to me that his wife had given him a ticket that morning containing four rides; he had used one coming in and lost the ticket during the day, and rather than admit having lost it he bought the new ticket and had the same number of rides punched out."—*Chicago Herald.*

##### A Freight Train "Held Up."

An Indianapolis dispatch says: A bold attempt at train robbery was made on the Pan Handle line Aug. 7. About midnight the switchmen in the freight yards discovered five men robbing a car of merchandise. They attempted to capture the robbers, but were compelled to throw up their hands and walk away. Two or three hours later five men, supposed to be the same persons who robbed the car, stopped an outgoing freight train just beyond the city limits. While the engineer and trainmen were covered with revolvers, the cars were all examined, but the robbers failed to find anything they wanted, and allowed the train to proceed on its trip. The robbers disappeared in the fields along the road. None of them wore masks. The leader was recognized as a notorious thief whom the police have been trying for months to capture.

##### Drought in the West.

There are reports of great damage by drought in the Northwest. With an area of 75,000 square miles bounded by Madison on the north, Bloomington on the south, Lake Michigan on the east and the Mississippi River on the west, it has been nearly ten weeks since rain fell. In southern Wisconsin there are thousands of acres where corn will not yield a peck to the acre. Without pasturage to browse upon or pools in which to stand during the hot hours of the day, the cattle have become so emaciated as to be wholly unmarketable. Hundreds of cows are being killed and shipped to market for a mere pittance.

##### Hog Packing at Chicago and Further West.

P. D. Armour, the Chicago pork packer, in an interview at Detroit last week, said concerning his branch establishments at Omaha and Kansas City: "I shall always make Chicago a distributing point, but Chicago has seen its best day in the pork packing line. Pork is found further West now than it used to be. The corn district has gone West, and hog-raising follows it. I am a pretty old man to go West to grow up with the country, but I must do it or have my business rust out, and I don't intend to do that. Michigan, Ohio, Indiana, Illinois and Wisconsin used to furnish hogs in great abundance, but when the land was tilled for other uses than the cultivation of corn, hog raising was not profitable and was dropped. In Southern Illinois tobacco is

now raised where corn used to be grown. West of Kansas City is now becoming the greatest corn country in the world, and there is where I'll find my hogs. Chicago's supremacy as a beef-shipping point is not affected in the same way. To supply the market, beef of several grades is necessary, and these grades are caused by the country in which the cattle are raised. All the states around Chicago are devoted increasingly to the raising of fine grades of cattle that make the choicest beef and will furnish the best qualities of meat. But a hog's a hog anywhere. \* \* \* I can get as good freight rates from Kansas City now as I can from Chicago."

##### Handsome Cars for the New York & Boston Line.

Eight months ago the Boston & Albany Railroad Company placed an order with the Wason Manufacturing Company for four drawing-room coaches, to be as elegant as possible, and with as many departures from the usual style as the Wason Co. thought best to recommend. Two months were devoted to the study of designs for the interior of the cars, and now they stand completed—as perfect in arrangement and as elegant in workmanship as can be imagined. At the request of the railroad company the exterior is as nearly like the ordinary coach as possible; but the interiors, designed by Mr. Bruce Pierce, of New York City, are a revolution in the appearance of cars. The sides of the coaches are in the form of an elaborate series of bay windows, over which are the new lunette windows invented by Mr. L. C. Hyde, of the Wason Co., which add greatly to the appearance and ventilation of the cars. The motif of the architecture is Byzantine. The cars were finished in carved mahogany and dead bronze trimmings, the designs of which, with those of the upholsterings, plush and hangings, were especially made for this order. Gas and oil are done away with. Instead of using elaborate lamps covered with nickel plate and hung with jangling chains, counterparts of old Roman lamps and center pieces are placed at intervals along the sides, furnished with the Julian system of electric lights. The cars contain all the usual conveniences and many new ones. These are so placed, however, that they do not appear gaudy or staring. In fact there is not a mirror nor a single piece of nickel plate in the cars outside of the lavatories. The effect is a very pleasing one of quiet, subdued elegance.—*Springfield Homestead.*

The New York, New Haven & Hartford is also building six drawing-room cars, which will be finished in a few weeks.

##### No Work for a G. P. A. on this Road.

Pennsylvania seems to be distinguished by having within its borders a road that is so overrun with business that it has to build a fence to keep the people away; at least a newspaper item says that at Cornwall the Lebanon & Cornwall has built a high fence between its station and that of the Philadelphia & Reading, so that passengers from the latter road cannot reach the former's cars.

##### The Paris Railroad Jubilee.

In the *Journal des Transports* (Paris) of July 10 appears the statement that the jubilee celebration of the fiftieth year of railroads in France has "ended its adventurous career." By a judgment of the Tribunal of Commerce the company is declared bankrupt.

##### Train Wreckers.

A Davenport (Ia.) dispatch says: On Aug. 9 an attempt was made to wreck the east-bound train on the Chicago, Rock Island & Pacific, near Iowa City. The plot seems to have been to precipitate the train into the Iowa River. The engineer observed a misplacement of the rail on the right side, a few lengths west of the bridge, and managed to bring the train to a full stop before reaching the structure. On investigation it was found that spikes had been pulled from three rails, which would have been sufficient to throw the train into the river.

##### Egyptian Roads.

Major Marindin and Mr. Farrer, of the British Board of Trade, who were sent to Egypt to make inquiry into the working and condition of the railways, have handed to the Egyptian Government a voluminous report. During their stay they have visited every mile of line, inspected every workshop, and examined every department. It is understood that they have found the permanent way in better condition than was anticipated, but that the amount of rolling stock is deficient. They consider 45 per cent. of the receipts sufficient for the maintenance of the line, without any necessity for extra credits.

##### The Navy Bids.

The Secretary of the Navy opened on the 8th inst. the bids for the new vessels. Only three firms bid. Cramp & Sons, of Philadelphia, bid for all the vessels. The Union Iron Works, of San Francisco, bid for cruisers No. 4 and 5, and N. F. Palmer, Jr., & Co., of New York, representing the Quintard Co., for the two gunboats.

The bids of Cramp & Sons were as follows: Cruiser No. 1, class 3, \$1,248,000; cruisers Nos. 4 and 5, class 1, \$1,410,000 each; cruisers Nos. 4 and 5, class 2, three inch protective deck, \$1,325,000 each; cruisers Nos. 4 and 5, class 2, four inch protective deck, \$1,350,000 each; cruisers Nos. 4 and 5, class 3, \$1,405,000 each; gunboats Nos. 3 and 4, class 1, \$495,000 each.

Union Iron Works, San Francisco, cruisers Nos. 4 and 5, class 1, \$1,428,000 each.

N. F. Palmer, Jr., & Co., gun-boats Nos. 3 and 4, class 1, \$490,000 each.

##### Notes.

A house to house census of the population of Chattanooga just taken shows 36,903 inhabitants, an increase of 34 per cent. in the past year, and 300 per cent. since 1880.

The New York & Mobile Steamship Co. has filed a certificate of incorporation in New York.

The Illinois Live Stock Commissioners declare all danger from pleuro-pneumonia now past.

The pneumatic train signal is being put on the trains of the Richmond, Fredericksburg & Potomac.

The *Engineer* (London) says: "The action of the Dominion Government in disallowing the Act passed by the Manitoba Legislature for establishing railway communication between Winnipeg and the United States frontier was due to a clause in the Act, which provided that the contractors or others engaged on a contract which has the written approval of the provincial Minister of Public Works become *ipso facto* servants of the Crown. Under this Act, a railway contractor would have had power to take property without being liable for claims for damages, or to the operation of injunctions."

Armour & Co. have over 400 refrigerator cars in service. The discovery of a natural gas, and of a high grade of oil, near Kankakee, Ill., is reported.

A newspaper paragraph says that the "Iron Car Co." of New York, has ordered in Pittsburgh the material for 2,000 tube iron freight cars.

It is said that the Standard Oil Co., and possibly the Consumers' Gas Co., is prospecting with a hope of securing natural gas in the immediate vicinity of Chicago.

The committee of the New Hampshire Legislature which is investigating the Concord Railroad and other matters, is expected to report Aug. 23.



## RAILROAD LAW—NOTES OF DECISIONS.

## Powers, Liabilities and Regulation of Railroads.

In Missouri, the St. Louis Dispatch Company having a right of action against the St. Louis Transportation Company, the stockholders instructed the directors to bring suit thereon; but the directors fraudulently conspired with the transportation company, and refused to bring suit. The plaintiffs, a minority of the stockholders of the dispatch company, thereupon brought this action in their own name against the transportation company, without making the directors defendants. The Supreme Court decides that the action cannot be maintained. Where a cause of action accrues to a corporation, the general rule is that suit must be brought in the name of the corporation, and not by the stockholders. And in all those cases where, on account of the wrongful refusal of the directors or officers managing the affairs of the corporation to sue, the stockholders are allowed to do so, the recusant directors or officers must be made defendants, and the action is to be considered as primarily against them.<sup>1</sup>

The Legislature of Texas passed an act empowering the Governor to sell the Houston & Brazoria Railroad, and directing him to require bonds of the purchaser to keep the railroad in running order. At the sale the state bought in the road. The Legislature afterward passed a resolution again directing the Governor to sell the road "by public or private sale, upon such terms and to such parties as he may deem best for the security of the school fund." The Governor sold the road and one Taylor became the purchaser, and the Governor required of him the bond provided in the first act. The Supreme Court holds that as the sale had been made under the act it had performed its functions, and as the second sale was made under the resolution, the Governor had no authority to require the bond, and that the resolution authorizing the Governor to sell upon such terms as he saw best referred only to the price and times of payment, did not authorize him to demand the bond, and the condition of the bond could not be enforced in a suit at his instance.<sup>2</sup>

In Texas some of the stockholders of the Gulf, Colorado & Santa Fe bought up all of the stock and bonds of the Chicago & Milwaukee, and destroyed them. They did not, however, buy the road itself, but, taking themselves to be owners of the road from the purchase of the stock and bonds, they sold it to the Gulf, Colorado & Santa Fe. A creditor of the Chicago & Milwaukee having obtained judgment against the road, the Supreme Court decides that he had the right to levy execution on the road and franchise; the purchase and destruction of the stock and bonds, and subsequent sale to the Gulf, Colorado & Santa Fe, not constituting a dissolution of the Chicago & Milwaukee, so as to relieve it, as a corporation, from all its debts and obligations. Corporations organized for public purposes cannot, by contract of sale, lease or otherwise, render themselves incapable of performing their duties to the public, or in any way absolve themselves from the obligation which forms the main consideration for giving them a corporate existence, unless this be done by consent of the state, given through the charter, or in some other manner. Under the general corporation law of Texas, one railroad company has no power to buy another railroad, nor does that law authorize a railroad company to sell its road to another company, or to another person. Under Rev. St. Tex. art. 4,113, regulating the general right to amend railroad charters, and providing that any railroad corporation may, by amendment to its charter, project and provide for the locating, constructing, owning, maintenance and operating of a branch line to its original main line, while the right to construct, operate and maintain is conferred, it does not confer the right to buy another railroad.<sup>3</sup>

## Carriage of Goods and Injuries to Property.

In South Carolina it is held that a common carrier cannot exempt himself from liability for negligence by a contract with the shipper; that a provision in a contract of shipment that the shipper accepts the car provided by the company does not protect it if the car proves defective, and that it is no defense that the car belonged to another company, a connecting carrier.<sup>4</sup>

In Virginia, the Shippers' Compress Co. entered into a contract with the Virginia & Tennessee Air Line, an association composed of the Norfolk & Western and other corporations, by which the latter agreed to fill with cotton a certain amount of room on board the steamers Liscard and Linhope, at the port of Norfolk, said cotton to be placed on board on the eighteenth and nineteenth of October, 1881, on which dates the steamers were to be loaded and made ready to sail for Liverpool. The cotton was not delivered until several days after the time agreed upon, and, in consequence of the delay, the Shippers' Compress Co. was, by the terms of its charter-party, compelled to pay a large sum for demurrage, after having given the proper agent of the Virginia & Tennessee Air Line repeated and timely notice of the consequences which would result from its failure to deliver the cotton in time. The Supreme Court of Appeals holds that the subsequent acceptance of the cotton by the compress company was not a waiver of the stipulation as to time, and that it could recover the amount of demurrage so paid in an action against the Air Line.<sup>5</sup>

In Texas the Supreme Court holds that where one railroad company, without the statutory authority, conferred either by a general or private act, leases and surrenders the control of its line to another, it becomes liable for the torts of the company operating it which are committed upon its line.<sup>6</sup>

In Texas in an action against a railroad company to recover for injuries to crops caused by the construction of insufficient culverts, whereby the natural drainage of a flood was impeded, the Supreme Court decides that the company was not liable if the overflow was of such extraordinary character that ordinary prudence would not have provided against it in the construction of the culverts, but that if the flood, though extraordinary, might reasonably have been anticipated, the company was liable.<sup>7</sup>

In Maryland, the Court of Appeals holds that where a person's lands were used for a railroad track for some time the proper measure of damages is the fair rental value of such lands, for the time they were so used, where there is nothing to show that any special damage had been suffered.<sup>8</sup>

## Injuries to Passengers, Employees and Strangers.

In Arkansas, railroads being required by statute to post at the nearest station house a notice of the killing of stock by their trains, one who was missing a cow went upon the platform of the station to read a notice posted there, taking plaintiff with him to do the reading, as he himself was unable to read. Plaintiff, in climbing up the platform to read the notice, fell through a defective plank and was injured. The Supreme Court holds that plaintiff was in the same position as a passenger, and can recover damages.<sup>9</sup> In the same state a passenger, alighting from a train, was injured. The Supreme Court, in affirming a judgment for \$1,000 in his favor, reviews the facts as follows: "The supposed omissions of duty by the defendant consisted in failing to stop the train long enough to enable the plaintiff to get off in safety, and in imperfectly lighting the station for which the plaintiff was bound. He was in his twentieth year, and the accident happened about 2 a. m. of a dark night. His testimony was that as soon as the station was announced and the train had come to a stand-still, he arose from his seat, made his way out to the car platform, saw no lights, and was in the act of

stepping on to the station platform, when the train suddenly started and threw him between the train and platform, crushing his foot. He also swore that the train stopped about three minutes or less; that the cars were lighted and cast some light on the platform, which he could see as he was in the act of stepping off. The other testimony, as well that for the defendant as that given in behalf of the plaintiff, conduces to establish the facts that the train stopped near three minutes and that the station was insufficiently lighted."<sup>10</sup> In Missouri the Supreme Court rules that in an action by a woman in good health, 65 years old, and weighing 170 pounds, to recover damages for personal injuries occasioned by the starting of a train while she was in the act of alighting, the jury may take into consideration the "age, sex, and physical condition" of the plaintiff in determining whether she exercised ordinary care and diligence at the time of the accident. The Court says: "She belonged to that class of fleshy old ladies, many of whom are travelers, and necessarily so, who can and do move with reasonable celerity, but not so quickly as many who are younger, stronger and more active. She was received as a passenger on defendant's train; and, when the train arrived at her place of destination, was entitled to a reasonable time in which to get off, and it was the duty of the defendant to stop its train for that length of time. What would be a reasonable length of time for a light young active man, might and ordinarily would not be a sufficient length of time for a heavy old woman to get safely off a train. The jury were called upon to determine whether the defendant's train stopped a sufficient length of time for the plaintiff to get off. How could they determine that question without considering what kind of a passenger she was—her age, sex and physical condition."<sup>11</sup> In Massachusetts a passenger in a car was injured by the falling of a porcelain lamp shade from the ceiling of the car. The Supreme Court affirms a verdict in his favor.<sup>12</sup>

In North Carolina a railroad section master, duly authorized to hire, direct, and discharge the hands of his section, suddenly ordered a new section hand, in the course of his employment, to jump from a swiftly-moving train. The servant was injured. The Supreme Court holds the railroad responsible.<sup>13</sup>

In Tennessee a locomotive engineer was killed by reason of the derailment of his engine caused by a collision with a bull on the track. He was a capable and skillful engineer, the engine was in good order, and the accident was unavoidable, and not the fault of the company. A verdict of \$500 having been found by the jury in favor of the deceased's widow, she procured it to be set aside on the ground of inadequacy of damages. On a new trial, the verdict was \$5,000, from the judgment entered upon which the company appealed. The Supreme Court decides that the judgment appealed from should be reversed, and judgment rendered for the amount of the first verdict, with interest from the date of its rendition, the company to pay costs accruing up to that date, and the plaintiff all subsequent costs.<sup>14</sup>

In a case in Kentucky the deceased was a watchman in the company's employ; his duty was to look after the cars in the station yard. The accident happened at night when an engine was moving south at a speed but little faster than one walking, and deceased was walking north on the track toward the engine; the engine bell was ringing and its head-light burning. The deceased must have seen the engine, and have known that it would run over him if he did not leave the track. The engineer did not see deceased, though he might have done so had he been on the lookout, as he was carrying a lighted lantern at the time. The Court of Appeals holds that the evidence was not sufficient to charge the railroad with wilful negligence in causing the death of the deceased, and thereby make it liable, under the statute, to his widow, for punitive damages.<sup>15</sup>

In Missouri the Supreme Court holds that a train dispatcher, having control of the movements of trains upon a railroad, is, in the performance of his duties as such, a representative of the company, and for an accident occurring through his negligence to another employee subordinate to him, and subject to his orders, the company will be liable. In such case it is not negligence on the part of the employee to act, in an emergency, upon the verbal order of the train dispatcher, although a rule of the road required that the specific order should be in writing.<sup>16</sup>

In Kentucky an experienced freight conductor was knocked off his train while passing through an overhead bridge, it appearing that one could stand upon the ordinary cars used by the company and pass the bridge safely, but that the train in question happened to contain one car which was too high for this. The Court of Appeals holds that his representatives cannot recover damages from the railroad, saying: "The deceased was in charge of the train. He was bound to know its condition and character. The extra height of one of the cars was visible to him. He knew that thereby there was an increased risk of injury; and he was chargeable with knowledge that, upon that particular occasion, there was one car in his train which, while it could pass under the bridge, yet that it was of such a character that one standing erect upon it would be exposed to danger from coming in contact with the bridge. We do not mean to say that a conductor must stop and make a calculation by feet and inches as to whether the cars of his train will pass safely under a bridge. It is the duty of the company to use reasonable care in providing those which are safe; but in this instance the deceased was controlling the train, and knew that the size of one of the cars subjected him to danger of injury, provided he placed himself upright upon it; and yet he did so, and lost his life. It is urged, however, that the company was required by law to so construct its bridges, and make up its trains, that an employee could stand upright upon any car, and pass in safety over the road. Consideration for humanity should certainly prompt it to do so; and, as already said, it is its duty to use reasonable care in doing so; but an employee, if he knows that there is a chance of danger or an increased liability to it, must use corresponding care. Here the deceased knew it, and, knowing it, he by his own act placed himself in the way of it. It is said that if a railroad company should send out an engine so large that it could not pass through a tunnel upon its road, and in charge of an engineer who did not know the fact, and in attempting to pass through it he should be killed by the smoke-stack being knocked off, and falling upon him, that the company would be liable. Undoubtedly; but that is not this case. Here the employee exposes himself to the danger, knowing that by reason of the size of the car there is a liability to it. Moreover, he does so as the superior officer in charge of the train; and, if a brakeman or sub-employed had thus lost his life, the charge of wilful neglect would have been based doubtless upon the conduct of the conductor in taking such a car in his train. It is not a case where the appliance could not pass under the bridge; but, if we may be allowed a homely illustration, it is as if, in the supposed tunnel case, the engineer had made a smoke-stack of himself, knowing that it created a liability to danger, and had thus been injured."<sup>17</sup>

In New York, in an action to recover for injuries done to an infant seventeen months old, by the alleged negligence of a railroad company, where the sole negligence charged was that the engineer ought sooner to have discovered the child on the track and stopped the train before it reached him, and the evidence shows that after the engineer discovered that the child was in peril everything was done that could be to arrest the speed of the train, the Court of Appeals holds that it can-

not be inferred that the engineer ought to or could have seen the child sooner than he did; also, that the engineer had the right in broad daylight, when his train is visible and its approach could be heard, to assume that the child would leave the track in time to escape injury. The railroad company is not responsible for any error in judgment, if there was any, on the part of the engineer as to the speed of his train, the distance, age and peril of the child, and his ability to stop the train in time to protect him. All that the engineer was bound to do, after the discovery of the peril, was to use reasonable diligence and care to avert it.<sup>18</sup>

In North Carolina, the track crossed a street about 600 ft. distant from the place of the accident, and passed in a curve onto the adjoining land, whence it again emerged into and crossed the street. The Court refused to instruct the jury that, if the plaintiff could have seen the approaching train when it passed at the first crossing, if he had looked, he was guilty of contributory negligence, and cannot recover. Seeing the train at the first crossing only imposed upon the plaintiff greater caution in moving onward to the second crossing.<sup>19</sup>

- <sup>1</sup> Slattery v. St. Louis & N. O. Trans. Co., 4 S. W. Rep., 80.
- <sup>2</sup> Ireland v. Taylor, 4 S. W. Rep., 65.
- <sup>3</sup> Gulf C. & S. F. R. Co. v. Morris, 4 S. W. Rep., 156.
- <sup>4</sup> Wallingford v. Columbia & G. R. Co., 1 S. E. Rep., 19.
- <sup>5</sup> Norfolk & W. R. Co. v. Shippers' Compress Co., 1 S. E. Rep., 39.
- <sup>6</sup> International & G. N. R. Co. v. Underwood, 4 S. W. Rep., 216.
- <sup>7</sup> Sabine & E. T. R. Co. v. Hadnot, 4 S. W. Rep., 139.
- <sup>8</sup> Balt. & O. R. Co. v. Boyd, 7 Cent. Rep., 435.
- <sup>9</sup> St. Louis, I. M. & S. Ry. v. Fairbairn, 4 S. W. Rep., 49.
- <sup>10</sup> St. Louis, I. M. & S. Ry. Co. v. White, 4 S. W. Rep., 32.
- <sup>11</sup> Hickman v. Mo. Pac. R. Co., 4 S. W. Rep., 127.
- <sup>12</sup> White v. Boston & Albany R. Co., 4 New Eng. Rep., 267.
- <sup>13</sup> Patton v. Western N. C. R. Co., 1 S. E. Rep., 863.
- <sup>14</sup> Chesapeake, O. & S. W. R. Co. v. Higgins, 4 S. W. Rep., 47.
- <sup>15</sup> Lungenfeiter v. Louisville & N. R. Co., 4 S. W. Rep., 185.
- <sup>16</sup> Smith v. Wabash, St. L. & P. R. Co., 4 S. W. Rep., 139.
- <sup>17</sup> Derby v. Kentucky Cent. R. Co., 4 S. W. Rep., 303.
- <sup>18</sup> Chrysler v. Troy & Boston R. Co., 7 Cent. Rep., 244.
- <sup>19</sup> Scott v. Wilmington & W. R. Co., 1 S. E. Rep., 151.

## General Railroad News.

## MEETINGS AND ANNOUNCEMENTS.

## Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Western Society of Engineers holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The National Association of General Passenger Agents, at St. Paul, Minn., Sept. 20.

The Master Car and Locomotive Painters' Association, New York, Sept. 14.

At Petosky, Mich., on Aug. 18, will occur the next meeting of the Michigan Passenger Association.

General Time Convention, Hotel Brunswick, New York City, Oct. 12.

## Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Danbury & Norwalk,  $\frac{1}{2}$  per cent., payable Aug. 15.

Kansas City, Fort Scott & Gulf, 4 per cent. on preferred stock and 2 on common, payable Aug. 15.

Marquette, Houghton & Ontonagon, semi-annual, 3 per cent. on preferred stock, payable Aug. 15.

## PERSONAL.

—It is said that Assistant Superintendent McGinnis of the North Chicago Rolling Mills is soon to succeed Superintendent E. C. Potter, who will be promoted to the position of Assistant General Manager of the company.

—Thomas T. Weirman, Superintendent and Chief Engineer of the Pennsylvania Canal Company, and a well-known civil engineer, died in Harrisburg, Pa., Aug. 2, after an illness of over a month. He made the original survey of the Brooklyn docks. Mr. Weirman was 74 years old, and was the father of Mrs. Theodore N. Ely, of Altoona, Pa.

—W. H. Newman, who has just been made Third Vice-President of the Missouri Pacific, commenced his railway career in 1869 as station agent at Shreveport, La., of the Southern Pacific of Texas, now the Texas & Pacific, was promoted to the General Freight Agency of the company in 1874 and continued in that position until 1884, when he was made Traffic Manager of the Gould lines in Texas and the Texas Pacific. In this position he remained until January, 1886, when he was made General Traffic Manager of the entire Missouri Pacific system.

—Horace Abbott, one of the best known iron manufacturers in this country, died last week at Baltimore, Md., aged 81 years. He was born in Sudbury, Mass. In early life he was a blacksmith. He went to Baltimore in 1836 and bought the Canton Iron Works from Peter Cooper of New York. He made the first large steamship shaft of wrought iron in this country. It was for the Russian frigate Kamschatka, built for Nicholas I., in New York. It weighed 26,000 pounds, and aroused great interest when placed on public exhibition in the Exchange in New York. He supplied Mr. Ericsson with the plates of armor of the first monitor. He also supplied the plates for nearly all the vessels of that class built on the Atlantic coast. Mr. Abbott had been retired from active business for some time.

## ELECTIONS AND APPOINTMENTS.

Chautauqua Lake.—At the annual meeting at Jamestown, N. Y., the old directors were re-elected, and they re-elected Robert N. Marvin, President; John C. Williams, Vice-President, and Daniel H. Post, Secretary.

Chicago, Kansas & Southwestern.—The incorporators of this road in Nebraska are: J. H. Miles, Geo. W. Carpenter, M. J. Leblance, J. W. Hosford, George Bowker, John A. Randolph, of Rulo, Neb., and John Schilling, of Hiawatha, Kan.

Chicago, Rock Island & Pacific.—William Gessler is appointed Master Mechanic of the Southwestern Division, with headquarters at Trenton, Mo., in place of R. O. Carscaden, deceased.

Cincinnati, Hamilton & Dayton.—The directors have chosen A. V. Winslow President and Christopher Meyer Vice President in place of Messrs. Stayner and Ives, who have resigned from the board of directors. Julius Dexter has been added to the board.

Cincinnati, New Orleans & Texas Pacific.—Geo. Bemus and Chas. Egly have been appointed traveling freight agents for the territory north of the Ohio River and east of the Louisville, New Albany & Chicago road.



**Cleveland & Mahoning Valley.**—At the annual meeting the old directors and officers were re-elected.

**Florida Railroad Commission.**—This board, created by a law which went into effect Aug. 3, consists of George G. McWhorter, of Milton, E. J. Vann, of Madison, and William Himes, of Webster.

**Grand Trunk.**—C. V. V. Ward, late of the New York, Lake Erie & Western, has been appointed Eastern Passenger Agent, with office at 271 Broadway, New York.

**Kansas City, Rich Hill & Southern.**—The incorporators of this new Missouri company are: E. L. Martin, H. M. Holden, S. S. Scott, Theo. S. Case, W. P. Rice, S. P. Keller and T. B. Bullene, of Kansas City; P. E. Emery, of Topeka; W. K. Royce, of Rich Hill, Mo.; J. C. Ferguson, of Fayette, Mo.; R. C. Massie, of Rich Hill; T. B. Francis and T. C. Robinson, of Mulberry, Mo.

**Louisiana Land, Railway & Improvement Co.**—President, E. B. Wheelock; Vice-President, W. B. Schmidt; Treasurer, A. Baldwin; Secretary, Robert Strong. Directors: George J. Gould, Greenville M. Dodge, Amos L. Hopkins, Amos H. Caley, Albert Baldwin, Wm. B. Schmidt, Edward B. Wheelock, Wm. W. Howe and Robert Strong.

**Louisville & Jeffersonville Bridge Co.**—The directors of this new company are Dennis Long, President; John F. Reed, Vice-President; James W. Baird, Secretary; Edward Fulton, Joseph Huffaker, Christian Stege, David Frantz, Jr., J. G. Howard and John C. Zulauf.

**Louisville, New Albany & Chicago.**—R. M. Arnold has been appointed General Freight Agent in place of J. J. Coleman.

**Mississippi Valley Freight Traffic Association.**—J. J. Rogers, Chairman.

**Missouri Pacific.**—W. H. Newman, General Traffic Manager, has been made Third Vice-President.

**Momence & State Line.**—The incorporators of this new Illinois road are: F. V. Davis, William Armstrong, W. B. Woodman and H. W. Holman, of Chicago, and F. B. Dyche, of Evanston, Ill.

**Natchez, Jackson & Columbus.**—H. Wilkins has been appointed master car-builder, vice Griffith Enders, deceased, with office at Natchez, Miss.

**Neversink.**—The directors of this new Pennsylvania road are: George F. Baer (President), Henry S. Eckert, Geo. B. Eckert, E. W. Coit, Simon Seyfert, P. R. Stetson and Jefferson Snyder.

**New Haven & Derby.**—Wm. H. Stevenson has been chosen President, vice Sperry, resigned.

**Omaha & Yankton.**—President, H. N. Shepard; Treasurer, F. F. Gray, both of Boston.

**Paducah & Tennessee.**—The officers of this new company are: President, Thos. H. Puryear, of Paducah, Ky.; Vice-President, R. L. Ellison, of Murray; Secretary and Treasurer, E. P. Noble, of Paducah. Directors, R. L. Ellison, John C. McElrath, B. C. Keys and L. C. Linn, of Murray, E. P. Noble, C. Gilbert, T. H. Puryear and J. M. Bigger, of Paducah; J. H. Strow, C. Parker, of Benton; J. H. Johnson, of Sharpe and W. W. James, of Paris, Tenn.

**Poughkeepsie, Hartford & New England.**—The incorporators of this New York corporation are: James Giffillan, W. Van Benthuyzen, W. A. Carlisle, E. P. Chapman, C. H. Wickes, David J. McPierce, L. C. Hunt, M. J. Glynn, Joseph McCandlin, P. Dickinson, James W. Perry of New York; Frank M. Whard, Newton, N. J.; William E. Cook, Bayonne, N. J.; George S. Field, Buffalo; W. W. Gibbs, John Weir, Robert C. W. Brock, Philadelphia; J. C. Stanton, C. H. Stanton, C. H. Swan, Brooklyn; Raymond L. Dowell, Elizabeth, N. J.; David McNeil, Hartford, Conn.; Henry Gay, William T. Gilbert, West Winsted, Conn.; George S. Frink, Irondele, N. Y.; James W. Husted, Peekskill, N. Y.; John I. Platt, E. White, M. S. Reynolds, and Peter Hume, Poughkeepsie.

**St. Louis, Keokuk & Northwestern.**—W. W. Baldwin has been appointed Receiver by the United States Circuit Court.

**Sedan & Moline.**—The directors of this new Kansas company are: John Lee, Frank Clark, J. M. Carpenter, C. M. Shortell and E. W. Davis, all of Sedan.

**South Pacific Coast.**—The annual meeting, Aug. 1, the following directors were elected: Leland Stanford (President), C. P. Huntington, Charles Crocker, C. F. Crocker, Timothy Hopkins, W. V. Huntington and N. T. Smith.

**Tennessee Midland.**—President, A. S. Buford, Richmond, Va.; Vice-President, T. C. Leake, Jr., Memphis, Tenn.; Chief Engineer, R. H. Temple, Memphis, Tenn.; Secretary and Treasurer, R. L. Traylor, Memphis, Tenn.

**Upper Coos.**—At a meeting in Colebrook, N. H., Aug. 6, the following were chosen directors: Frank Jones, of Portsmouth, N. H.; J. B. Cook, of Salem, Mass.; G. W. Armstrong, of Boston; J. W. Drew, of Lancaster; Enos G. Sweet, of Woonsocket, R. I.; Charles A. Sinclair, of Portsmouth, and George Vandyke.

#### OLD AND NEW ROADS.

**Allentown Line.**—It is reported that the Pennsylvania road is willing to re-establish this old line, for freight purposes only, between New York and the West over the Central of New Jersey and the Philadelphia & Reading.

**Atchison, Topeka & Santa Fe.**—C. H. Verner, of Boston, announces that he will bring suit to prevent the issue of the additional stock that the directors have authorized. He says: "The present capital is already in excess of the amount authorized by the charter, and no legislation or vote of the stockholders can make valid the proposed issue, as the charter is a contract between the company and every stockholder which the legislature reserved no right to amend and cannot change against the objections of the dissenting stockholders, because the constitution of the United States provides that no state shall pass any legislation which impairs contracts. Furthermore, you have no positive information that the purposes for which this stock is to be created are legitimate, and I believe that the issue, if permitted, will work great injury to the corporation. If you desire the company to maintain its dividend capacity, some decisive measures should be taken to restrain the directors from using the credit and funds of the company in unauthorized and reckless projects. The phenomenal increase in the liabilities of the company during the past eighteen months, amounting in round figures to \$100,000,000, including the proposed issue of stock, nearly all of which is on account of roads that will always be a burden, must impress all conservative stockholders that a halt in the present wild policy of the directors is absolutely imperative."

A through train is now run between Kansas City and the

west line of Scott County, Kan., via the Great Bend Extension, a distance of 415 miles.

During the month of July 131.9 miles of track were laid on various extensions of this road, divided as follows: Kansas and Indian Territory, 961; Colorado, 15; Missouri, Iowa, and Illinois, 20.4.

**Baltimore & Ohio.**—It is reported that a branch is to be built from Mount Airy, Md., to Gettysburg, Pa.

**Beech Creek.**—The Northern Central has filed in the United States Circuit Court a suit against the Vanderbilt heirs to compel them to live up to a contract made July 19, 1885, between W. H. Vanderbilt and the Pennsylvania and Northern Central roads concerning traffic agreements and guarantees on Beech Creek bonds.

**Bells Gap.**—The extension known as the Clearfield & Jefferson reports to date 2½ miles of track laid from Mahaffey to McGees, and a three mile branch from Irvona to Coke Ovens.

**Boston, Revere Beach & Lynn.**—This road carried 25,000 passengers on Sunday, Aug. 7. Extensive improvements in road, stations, cars and train service have been made this year, so that the seashore resorts along the line now have greatly increased conveniences for communication to and from Boston.

**Canadian Pacific.**—The 15,000 bales of cotton cloth shipped from Lowell, Mass., to Shanghai, China, over this road, in July, reached Vancouver, and were on their way across the Pacific in less than two weeks from the day they started.

About 5,000 men are now employed between Mattawamkeag and Megantic, and 1,000 more are wanted immediately by the construction department. Three thousand men are also at work on the line between Montreal and Sherbrook.

**Caraquet.**—This New Brunswick road is now complete to Poquemanché. Mr. Burns having secured new subsidies will continue the line to the harbor of Shippagan, making a total of 67 miles. The road connects with the Intercolonial at Bathurst, N. B.

**Chicago, Milwaukee & St. Paul.**—The extension from Albany to New Glarus, Wis., is nearly completed. A large force is at work ballasting and lining the track. Freight is now being handled to Monticello on the new line.

The survey for the extension from Tomahawk Lake, Wis., is being continued to Ashland.

This company's southwestern line is graded to Lawson, Mo., on the St. Joseph & St. Louis, and tracklaying will begin in a few days. From Lawson trains will be run to St. Joseph over the last named road, 43 miles.

**Chicago & Northwestern.**—The Northwestern will probably commence to haul ore from the Gogebic range to Escanaba within three or four weeks.

**Cincinnati, Hamilton & Dayton.**—This road has within a few weeks put into service ten new engines and a large number of new cars.

**Chicago, Kansas & Nebraska.**—Tracklayers have reached Wellington, Kan.

**Chicago, St. Louis & Pittsburgh.**—It is said that on the completion of the South Chicago & Southern this company's trains will enter Chicago over that road using the Pittsburg, Fort Wayne & Chicago terminal facilities. They would thereby save 7 miles in distance and many crossing stops.

**Cornwall & Lebanon.**—It has been decided to build a branch to New Holland, Lancaster County, Pa., on the Waynesboro Branch of the Pennsylvania.

**Duluth, Huron & Denver.**—Grading between Sauk Centre, Minn., and the Dakota line is nearly completed. All the money for building the road is said to have been secured.

**Duluth & Iron Range.**—The work of surveying a line to the new mines east of Tower, on the Vermilion Range, has been commenced. The distance is 22 miles.

**Duluth, Pierre & Black Hills.**—The line from Aberdeen to Pierre, Dak., is being located, and grading will begin in a few weeks.

**East & West of Alabama.**—The connection with the Georgia Pacific, giving connection with Birmingham, has been completed.

**Erie & State Line.**—This, the Pennsylvania portion of the "Nickel Plate" road, was on Aug. 9 consolidated with the reorganized company, the New York, Chicago & St. Louis Railway, which is to absorb and take the place of the various state corporations. The action is merely formal.

**Fort Smith, Wellington & Northwestern.**—Elk County, Kan., has voted \$100,000 in aid of this road.

**Freeport, Dodgeville & Northern.**—The contract for construction from Freeport, Ill., to Dodgeville, Wis., has been awarded to Ryan & McDonald, and work will be begun at once. The road will follow the valley of the Pecatonica River.

**Fremont, Elkhorn & Missouri Valley.**—It is stated that the Northwestern Coal and Oil Co. and syndicate of Milwaukee capitalists have consolidated to work a Wyoming oil field some 125 miles west of Fort Fetterman. The officers of the consolidated company are said to be: President, W. F. Fitch, General Manager of the Fremont, Elkhorn & Missouri Valley Railroad; Vice-President, K. C. Morehouse, General Freight Agent, and Secretary, J. R. Buchanan, General Passenger Agent of the road named.

**Hartford & Connecticut Western.**—The stockholders meet at Hartford Aug. 16 to consider the proposition to build a branch to Springfield, Mass.

**Hawkinsville & Western.**—Incorporated in Georgia to build a road from Hawkinsville to Perry or Fort Valley.

**Jacksonville & Atlantic.**—This Florida road is to be changed from 3 ft. gauge to standard.

**Kansas City & Pacific.**—This road has bought the Parsons & Pacific, and took possession Aug. 1. The consolidated road is in operation from Grant Centre to Coffeyville, Kan.

**Kansas City, Rich Hill & Southern.**—Incorporated in Missouri to build a road from Kansas City southeast to Rich Hill, Mo., through the coal fields of New Home, Home and West Point townships. Surveys have already been begun.

**Louisiana Land, Railway & Improvement Co.**—Incorporated in Louisiana to develop timber, mineral and agricultural resources and to build railroads. This is an organization in the "Gould interest" to improve the lands of the Missouri Pacific system; large additional tracts have also been acquired. The capital stock is fixed at \$2,000,000.

**Louisville & Jeffersonville Bridge Company.**—Organized at Jeffersonville, Ind., last week, with a capital

stock of \$1,500,000 to build a bridge over the Ohio River between Jeffersonville and Upper Louisville. The bridge will have rail, street car, and wagon ways. Negotiations are pending toward letting the contract, and work will likely be commenced within two months. The Ohio & Mississippi and the new Ohio River Road will use it.

**Louisville & Nashville.**—The new shops to take the place of several division shops will be located at Decatur, Ala. They are to cost \$300,000 and work will be begun by or before Oct. 1.

**Louisville, St. Louis & Texas.**—Forty-seven miles of this road are ready for track-laying. About 36 miles of track are between Cloverport and Owensboro, and the remainder between West Point and Cloverport. The right of way is being secured between Owensboro and Henderson, and the line is to be put through to Henderson at once. At Henderson it will connect with the Ohio Valley road, already in operation from Henderson to Princeton, and now pushing through to Jackson, Tenn. This will make the distance 138 miles between Louisville and Henderson, where it is now, by river, the shortest line of communication, 200 miles.

**Meigs Elevated.**—Construction work on this experimental road in Boston will begin next month.

**Milwaukee, Lake Shore & Western.**—It is reported that the Rhinelander Branch will be extended from Rhinelander, Wis., to Ashland, a distance of about 100 miles, and that the present line from Watersmeet to Ashland will be sold to the Chicago & Northwestern, which is now building an extension from Iron River to Watersmeet.

**Minneapolis, Sault Ste. Marie & Atlantic.**—During July 62 miles of track were laid, the total laid this season (70 miles) being as follows: From Minneapolis, east, 17 miles; from Turtle Lake, west, 22 miles; from Rhinelander, east, 16 miles; Flat Rock Branch, 5 miles; from Trout Lake, east, 7 miles; from Trout Lake, west, 3 miles. Between Turtle Lake and Rhinelander, 141 miles are in operation, so that the road is now 211 miles long. The maximum grade on the whole line will be 40 ft. per mile, and the work is mostly easy, so that 100 miles will probably be laid this month.

**Mississippi Valley.**—This is the name of a company which proposes to build a branch of the Missouri Pacific from Bushbury to Capa Grande, Mo.

**Missouri Pacific.**—The St. Louis Globe-Democrat says that contractors who take large gangs of laborers from St. Louis to Southwestern points over this road on passes are cheating the road on a large scale by smuggling into their parties many paying passengers, who have been bargained with at prices much under the regular ticket fares. It is said that officials of the road are implicated in the fraud.

**Momence & State Line.**—Articles of incorporation filed in Illinois for a line from Momence to the Indiana line in Kankakee County.

**Neversink.**—Organized at Reading, Pa., to build a short branch of the Philadelphia & Reading in Reading, Pa.

**New Brunswick.**—On the extension of this road from Edmundston, N. B., to Riviere-du-Loup, Que., 60 miles are graded. Rails sufficient to lay 40 miles are expected from England at once, and track is now laid 4 miles out of Riviere-du-Loup. Some 1,800 men are at work. The length of the line from Riviere-du-Loup to Edmundston is 87 miles—75 in the province of Quebec and 12 in New Brunswick.

**Newcastle Northern.**—Certain stockholders and creditors have filed a bill in equity at Newcastle, Pa., claiming that the sale of the road in January last to Mr. Johnson and its subsequent sale by him to the Newcastle & Shenango Valley road were unjust, and demanding that an accounting be had.

**New Roads.**—A road is talked of from the Western Maryland to Manchester, Carroll County, Md. Geo. A. Shower, of Manchester, is chairman of a committee that is canvassing the matter.

The proposed road between Rockland and Camden, Me., will, it is said, be constructed very soon.

**New York & Boston Rapid Transit.**—A Boston report says this company has four surveying parties at work in Massachusetts, Connecticut and New York, and that they will have the whole line located by Oct. 30. It is said that the capital is raised and that entrance will be had into Boston over the Boston & Maine and Boston & Providence both, which seems rather extravagant for a new road. The cost is now estimated at 37 millions, of which two millions are allowed for terminal grounds and buildings at Fifty-ninth street, New York, and seven for the road thence to Harlem River. It is proposed to provide the necessary elasticity, however, the limit of stock and bonds (half each) being set at \$80,000,000.

**New York, Cleveland & St. Louis.**—This, the Ohio portion of the "Nickel Plate" road was on Aug. 9, decided to the purchasing committee under the reorganization. This is a necessary formality in the transfer of the road to the new consolidated company, the New York, Chicago & St. Louis Railway.

**New York, Lake Erie & Western.**—The Stockholder gives the following synopsis of the new agreement between the New York, Lake Erie & Western and the New York, Pennsylvania & Ohio. It went into effect at the beginning of the current half year, but was only recently ratified by the English shareholders. Under the lease the Erie had to pay the New York, Pennsylvania & Ohio as rental 32 percent. of the gross earnings of the road; but if 32 percent. exceeded \$6,000,000 per annum, the Erie had to pay 50 percent. of such excess until an amount equal to 35 percent. on the whole sum was reached. The London voting trustees have just issued a circular in which they say: "The representatives of this company having come to the conclusion that in the interest of both companies the arrangement for giving this company 50 percent. instead of 32 percent. on gross earnings over \$6,000,000 might be advantageously altered, the following arrangement has, after long negotiation, been made: (a) The percentage receivable by this company on its gross earnings up to \$6,000,000 is to remain 32 percent. (b) Such percentage on entire gross earnings is to be increased by one-tenth of 1 percent. (calculated on the entire gross earnings) in respect of every \$100,000 of gross earnings exceeding \$6,000,000 until \$7,250,000 is reached, when this company is to receive one-third of the entire gross earnings. (c) After the losses of the Erie Company, if any, in working this road have been liquidated, and \$100,000 accumulated and maintained in their hands as a guarantee fund, all further profit shall be divided equally between the two companies, provided that the share of this company shall not exceed \$100,000 in any one year (or, on certain conditions, \$150,000), which extra profits, however, are to be spent in improvements on this road."

"The Erie under the lease guaranteed to carry over this



road at least 50 per cent. of all its east-bound through traffic, and 65 per cent. of all its west-bound through traffic. By the new arrangement these minimum percentages are increased to 55 and 70 per cent. respectively. By another alteration, arrangements have also been made under which the Erie will deliver a portion of its traffic at Jamestown instead of Salamanca (by way of the Buffalo & Jamestown, which is also leased by the Erie). These arrangements will enable the Erie to ship west by this road a considerable amount of local traffic from Buffalo and other places which could not, without loss, be sent by way of Salamanca, and which has consequently hitherto been sent over other lines running west from Buffalo. It is further agreed that, instead of \$70,000 per month, as fixed by the lease, the Erie shall pay to this company \$100,000 per month in rental account, besides the \$240,000 half-yearly to meet the prior lien interest. The relations of these roads with the Chicago & Atlantic are now on a satisfactory footing and the latter is doing a largely increased business.

The quarterly statement, as submitted to the State Railroad Commissioners, for the quarter ending June 30, shows the following comparisons with the corresponding period last year:

Quarter end, June 30—	1887.	1886.	Inc or Dec.	P. c.
Gross earnings .....	\$6,031,650	\$5,580,738	I. \$452,912	8.1
Operating expenses .....	4,984,565	3,839,293	I. 245,272	6.3
Net earnings .....	\$1,949,085	\$1,741,445	I. \$207,640	11.9
Other income .....	293,823	348,920	D. 55,097	15.7
Charges .....	1,866,207	1,878,053	D. 11,846	0.6
Net income .....	\$376,712	\$212,312	I. \$164,400	77.3

**New York & Long Island.**—Incorporated in New York to construct a tunnel under the East River, and build and operate a railroad from Long Island City to Thirtieth street and Ninth avenue, New York, with a branch to Washington Square. Capital stock, \$100,000.

**New York & New England.**—It is reported that this road, which runs two through Boston-New York trains daily, one going over the New York, New Haven & Hartford from Willimantic and the other from Hartford, has asked to have three more put on but has been refused by the latter road. The new bridge across the Connecticut, the raising of the tracks in Hartford, a new engine house at East Hartford, and other improvements soon to be made will cost \$300,000.

**New York, New Haven & Hartford.**—New station buildings will be erected at Mamaroneck, Larchmont, Harrison, Rye, Pelhamville and West Rochelle. The heavy grades and curves at Mount Vernon and New Rochelle are to be reduced, and estimates will be made for third and fourth tracks on the Harlem River branch.

**Norfolk & Western.**—Eighty-five miles of the Clinch Valley Division are under contract and work is progressing vigorously.

**Northern Pacific.**—It is said that there will be a sharp contest for the control of this road at the annual meeting in New York next month, the Oregon Transcontinental interest having given notice that it will put up a new ticket for directors. The Oregon Transcontinental owns large blocks of both common and preferred Northern Pacific stock, and is said to be in close sympathy with the Union Pacific.

The company will open a traffic office in San Francisco, and the Pacific Coast Steamship Company will run steamers to Tacoma exclusively for the road's business.

**Omaha & Yankton.**—This proposed road is now being surveyed. The line is about 200 miles long, and the project is said to be backed by English capitalists.

**Pacific.**—The investigation by the congressional commission at San Francisco was continued Aug. 4 by the examination of David Strong. On Aug. 5 Mr. Stanford was examined concerning the relations between the Central Pacific and Wells, Fargo & Co.'s Express, and also in regard to the Occidental & Oriental Steamship Co.

**Paducah & Tennessee.**—Projected to run from Paducah, Ky., via Benton and Murray to Paris, Tenn.

**Paris, Georgetown & Frankfort.**—Bourbon County, Kentucky, has voted \$250,000 in aid of this road.

According to a statement which has appeared in a German paper, the omnibuses and tramways of Paris carried in 1884 250,000,000 persons, the cabs had 48,000,000 fares, while 65,000,000 travelers arrived at and departed from the railway stations, and 88,000,000 of passengers traveled by steamers. The circulation in public conveyances exceeds half a million per day. On Sundays and fête days it rises over 600,000, and on Fridays it sometimes falls below the half million. A more striking fact, however, than any of these is that the Paris omnibus and tram cars carry more than twice as many persons as all the French railways put together. Paris is the tramway capital of Europe.

**Pennsylvania.**—The Broad street station in Philadelphia is to be enlarged and have an entrance on Market street.

**Philadelphia & Reading.**—It is understood that a foreclosure of the original first mortgage of the Schuylkill Navigation Co. will be necessary as a step in reconstruction. This mortgage, long in default, was recently assumed by the Reconstruction Trustees of the Reading. It was originally for \$230,850, but has been reduced by various payments to \$184,850. It was made on Feb. 18, 1833, to Stephen Girard, and covers all rights, franchises and property of the Schuylkill Navigation Co. as a first lien.

**Phoenix.**—Completed from Phoenix, Pa., north, 3 miles.

**Pontiac & Pacific Junction.**—This Canadian company will give out a contract for construction of 10 miles from the Coulonge River westward. The bridge over that river will probably not be built until next winter.

**Richmond & Danville.**—This road will have an elaborate exhibit at the coming Atlanta fair.

**Ripley & Mill Creek Valley.**—Grading is completed on this road from its junction with the Ohio River road to Ripley, W. Va., 13 miles. It is expected that the road will be in running order early in September.

**Rochester & Ontario Belt.**—This road was sold under foreclosure at Rochester, N. Y., Aug. 8, and was bought by Charles Parsons, Jr., Vice-President of the Rome, Watertown & Ogdensburg for \$235,000.

**Rome & Decatur.**—Of the 60 miles between Rome, Ga., and Atlanta, Ala., one-half is completed.

**St. Louis, Arkansas & Texas.**—The company has established a hospital at Cairo, Ill.

**St. Louis Bridge & Tunnel.**—The St. Louis City Council has passed a bill authorizing this company to build a double track extension from its present terminus at Twenty-first street, westwardly through the Mill Creek Valley to the western city limits. It specifies that the company shall not charge more than \$1 a car for delivering freight, and that all car-loads of freight brought across the bridge shall be delivered free, and that passengers shall be transported over

the entire length of the road for 5 cents each. It does not require the company to pay anything into the city treasury for the franchise.

**St. Louis & Chicago.**—Work has commenced on the extension from Springfield, Ill., north to Eureka, 75 miles. That portion of the southern extension between Litchfield and Mt. Olive, 9 miles, is completed.

**St. Louis, Keokuk & Northwestern.**—President W. W. Baldwin has been appointed receiver and has reappointed the operating officers. Settlements must be made with the receiver for business from and including July 22.

**Seattle, Lake Shore & Eastern.**—Twenty miles of this road is graded.

**Sedan & Moline.**—Incorporated in Kansas to build a road from Moline, Elk County, to Sedan, Chautauqua County. Capital, \$4,000,000.

**Southern Pacific.**—A branch of the Central Pacific, three miles, from Seminary Park station to Mills College, Cal., is said to be contemplated.

**South Pennsylvania.**—Mr. Carnegie, Mr. Phipps and other prominent stockholders are now in Europe, and Geo. F. Baer, of Reading, chairman of the trustees appointed by the bond and stockholders, is soon to sail, so that nothing of importance will be done toward the resumption of building operations for a month or two yet.

**Tavares, Apopka & Gulf.**—Grading has been completed to a point within 15 miles of Kissimmee, Fla.

**Tennessee, Carolina & Georgia.**—Incorporated by W. B. Thomas, of Athens, Ga., and others to build a road from Cornelia to Locust Point.

**Tombigbee.**—Preliminary surveys have been completed from Columbus, Miss., to Decatur, Ala., 180 miles.

**Union Elevated, Brooklyn.**—The Kings County Elevated road has instituted proceedings to enjoin this company from continuing its work on Myrtle avenue.

**Union Pacific.**—A Boston despatch says that sweeping reductions in officers and salaries are to be made. The Traffic Manager, General Freight Agent, Assistant General Freight Agent and General Ticket Agent will, it is said, be retired or assigned to other duties.

**Upper Coos.**—The stockholders of this New Hampshire road have voted to increase the capital stock to \$350,000. Construction has begun on this New Hampshire road.

**Utah Central.**—The San Francisco Examiner has the following:

"A gang of Union Pacific men are now busy locating the extension of the Utah Central through Nevada. The Union Pacific is seeing that it must have a through line to San Francisco, and it has taken decisive steps to push it through. The line is being located from Salt Lake City to Black Rock, twelve miles north of Milford, thence across the Fifty-mile Desert, along the southeastern line of White Pine County into Lincoln. From there the route extends over the high Shoshone range at a point eight miles south of the Patterson district. Then it cuts through Nye and Esmeralda counties, and finally over the Sierra Nevada at Walker River Pass."

**West Shore.**—Drawing-room cars are now run through between Point Pleasant, N. J., on the New York & Long Branch, and Saratoga, via the Pennsylvania, West Shore and Delaware & Hudson Canal roads.

**Wheeling, Pittsburgh & Baltimore.**—The Baltimore & Ohio Short Line from Greenwood, Pa., to Little Washington, Pa., has been consolidated with this road. Both are owned by the Baltimore & Ohio.

## TRAFFIC AND EARNINGS.

### Coal.

The coal movement for the week ending Aug. 6 is reported as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Anthracite .....	687,647	687,175	I. 472	3.1
Bituminous .....	262,522	298,717	D. 36,195	12.1
Coke (July 30) .....	69,138	108,200	D. 39,062	36.1

Cumberland coal shipments for the week ending Aug. 6 were 52,196 tons, and for the year to that date, 1,823,672 tons, an increase of 641,686 tons as compared with last year.

The coal tonnage of the Pennsylvania road for the week ending July 30 was:

Line of road .....	Coal.	Coke.	Total.	1886.
.....	204,245	69,138	273,383	276,860

Decrease for the week 3,477 tons, or 1.3 per cent.

### Cotton.

The cotton movement for the week ending Aug. 5 is given as below, in bales:

	1887.	1886.	Inc. or Dec.	P. c.
Interior markets .....	2,561	4,716	D. 2,155	45.7
Receipts .....	4,480	12,535	D. 8,055	64.3
Shipments .....	26,018	49,807	D. 23,789	47.7
Seaports .....	1,499	7,624	D. 6,125	80.3
Receipts .....	19,400	24,259	D. 4,859	20.0
Exports .....	158,537	199,425	D. 40,888	20.5

Total movement from plantations for the crop year ending Aug. 5 was 6,364,016 bales, against 6,469,387 for last year, 5,614,634 in 1884-85, and 5,649,007 in 1883-84.

### The Largest Cotton Crop.

The cotton crop which is now maturing in the South promises to be the largest ever raised in the United States. It is now estimated that it may reach 7,500,000 bales, or half a million bales in excess of any previous year. The crop of 1885 was an enormous one, reaching 6,500,000 bales, but the largest produced was in 1883, which was 6,992,234 bales. Not quite a century ago, in 1791, the United States sent 64 bags of cotton to England, and fifteen years later the export had increased to 100,000 bags. In 1834, however, the cultivation of this staple had so increased that the crop amounted to 1,000,000 bales, and it has never fallen below that since, though no record was kept of the crop during the years of the civil war. The largest crop ever raised by slave labor was in 1860, when it amounted to 4,669,770 bales. After the war and during the first few years of free labor the crop ranged between 2,000,000 and 3,000,000 bales, touching 4,000,000 in 1874, 5,000,000 in 1879 and 6,000,000 in 1881.—The Stockholder.

### The Inter-state Commission.

Liebes Brothers & Co., of San Francisco, complain that the Texas & Pacific and the Southern Pacific charge \$2.25 per 100 lbs. on freight to Houston or Galveston, while to other points in Texas, much nearer San Francisco, they charge \$4. Complainants are consequently compelled to ship to Houston or Galveston, and have goods reshipped back to destination.

The Vermont State Grange of the Patrons of Husbandry has filed a complaint against the Boston & Lowell and certain of its connections, alleging that higher freight rates are

charged between Boston and certain Vermont stations than between Boston and Montreal or Boston and Detroit.

Residents of Fairhaven, Vt., complain that the Delaware & Hudson Canal Co. charges \$12 a car-load for hauling coal and lumber from Whitehall to Fairhaven, a distance of nine miles, which rate they maintain is unreasonable and illegal.

Ayres & Fell, of Castle Rock and Arlington, Oregon, wool merchants complain that the Union Pacific and the Oregon Railway & Navigation Co. secretly and without the ten days' required notice put in effect a new classification and greatly increased tariff which causes great loss to petitioners, their Eastern correspondents and wool producers and dealers generally.

### The Shoe Pinches the Other Foot.

The Pittsburgh wholesale grocers' association have decided to co-operate with other Western wholesale shippers in protesting against the shipment from New York of small shipments at the same freight rate as that charged for a car-load of the same class of goods. It is claimed that if the Eastern people are successful in receiving such rates, they will secure a large portion of the business that properly belongs to the West.

### Lake Superior Ore.

Shipments of iron ore from the mines of the districts mentioned below for the season up to and including July 27, as reported by the Marquette Mining Journal, were as follows, in tons:

	1887.	1886.
Marquette, Marquette District .....	368,559	415,032
St. Ignace, " .....	40,351	38,500
Escanaba, " .....	397,837	262,370
" Menominee District .....	510,834	423,099
Ashland, Gogebic District .....	455,746	268,078
Two Harbors Minnesota Iron Co., Vermilion District .....	129,774	129,200
Total .....	1,963,101	1,526,288

### Weighing Live Stock.

The Chicago roads are to have all car-loads of live stock weighed, and have appointed Geo. L. Carman Superintendent to arrange for putting the system in force.

### Chicago-St. Paul Rates.

General Manager Harris, of the Chicago, Burlington & Northern, on Aug. 4, wrote a letter to Chairman Fairthorn indirectly threatening to reduce rates below the 40-cent basis established by the new Minnesota & Northwestern, but without naming any specific figure.

### Overland Fruit.

The lower rates this season on fruit from California eastward have considerably stimulated shipments. During the last week in July 40 car-loads were sent east from San Francisco. The trains are run faster than heretofore.

### Local Rates in Nebraska.

Lincoln (Neb.) merchants and others have made formal complaint to the State Railroad Commission that freight rates in the state generally, and especially on the Fremont, Elkhorn & Missouri Valley, are very much too high and are "unjust, unreasonable and extortionate." The special grievance is that local rates in Iowa and Minnesota are much lower than in Nebraska.

### Live Stock Rates.

The Trunk lines and the Central Traffic Association have agreed on the following resolution:

"That the present billing and settlement minimums on cattle, as per official classification, shall remain in effect, except that, when actually weighed, the minimum weight for collection of freight charges on cattle loaded in cars 29 ft. or under in length (inside measurement) shall be reduced to 19,000 lbs. until ten days after Sept. 20, 1887. On and after Oct. 1, 1887, the present settlement minimum of 20,000 lbs. shall be restored on such cars—actual weight to be charged in all cases when in excess of minimum."

### Illinois Coal Rates.

It appears that the rates on coal recently established by the Illinois Railroad & Warehouse Commissioners are regarded by the roads as excessively low, and that many of them have neglected to put the new tariff in force. Concerted action will probably be taken by the roads.

### Mississippi Valley Freight Traffic Association.

The Louisville & Nashville, Mobile & Ohio, St. Louis, Alton & Terre Haute, St. Louis, Iron Mountain & Southern, and Vicksburg & Meridian, have formed an association by the above name for the purpose of maintaining rates in the territory between the Mobile & Ohio road and the Mississippi River. J. J. Rogers is chairman.

### Hogs for Mexico.

A train of hogs recently was run from Kansas City to El Paso, 1,174 miles, in 106 hours, destined to the City of Mexico.

### Tennessee Coke.

The Etna Coal Co., of Chattanooga, Tenn., has contracted to ship 1,000 tons of coke a month to Arizona. This coke is shipped by way of New Orleans into Texas, New Mexico, and thence to the Copper Queen mines, its destination. Formerly Arizona and the mining country contiguous bought its coke supply in Pennsylvania.—Manufacturers' Record.

### Lake Superior.

The effect of insufficient means of shipping is said to be more apparent than ever. On the Menominee range the Selden mine has been closed because the ore could not be shipped. Several other mines are working with small forces. On the Gogebic range a number of mines that can produce ore cannot ship it, and most of the shipping mines, notably the Colby, Nimikon and Kakagon, are being worked with greatly reduced forces. Quite a number of Marquette range mines are in the same condition.

### Buffalo Elevators.

The Western Elevating Association, of Buffalo, have named a winter storage rate much lower than is to be obtained in any other grain centre in the country, and much needed additional storage facilities are being provided. Seven new elevators, the Coatsworth, the Dakota, Lake Shore, International, Minnesota, Niagara and Frontier, have either just been opened or are now in progress of construction or soon will be built. One firm has adopted plans that will provide 10,000,000 bushels of new storage capacity when completed. Buffalo has at present 43 elevators, with a capacity of 14,000,000 bushels, but this is still far from sufficient.—Exchange.

### Transcontinental Rates.

The Pennsylvania refuses to share in the low through rates now in force on California business, and which have been acquiesced in by the other trunk lines. The Pennsylvania places a strict construction on the long and short haul clause of the law, and bases its refusal to join the other roads in these rates on the fact that rates to Colorado points are higher.



## Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of June:	1887.	1886.	Inc. or Dec.	P. c.
Atch., T. & S. F.	1,541,876	1,252,754	I.	23.0
Net	708,093	613,606	I.	15.3
Balt. & Potomac.	122,797	109,471	I.	12.1
Net	44,263	42,734	I.	3.5
Buff., N. Y. & P.	228,170	226,560	I.	0.7
Net	55,167	45,532	I.	21.4
Cam. & A. and Br.	61,123	53,241	I.	14.8
Net	20,265	7,938	I.	156.0
Canadian Pac.	1,059,507	895,923	I.	18.2
Net	388,703	376,450	I.	3.2
Can. of Georgia.	394,765	346,754	I.	13.8
Net	91,070	29,802	I.	205.6
Eliz., Lex. & B. S.	93,744	67,412	I.	39.3
Net	34,200	21,594	I.	58.0
Ches., O. & S. W.	144,446	122,607	I.	17.8
Net	55,235	38,255	I.	44.3
Chi., Bur. & Q.	2,140,833	2,148,532	D.	0.3
Net	861,547	839,076	D.	2.7
Cl., C. & I.	374,448	335,741	I.	11.5
Net	152,389	132,876	I.	14.7
Del. & R. G. W.	90,406	89,428	I.	1.1
Net	20,723	35,120	D.	5.3
Ft. W. & Den. C.	44,231	30,135	I.	46.8
Net	11,765	8,676	I.	35.5
Grand Rap. & I.	241,189	195,124	I.	23.6
Net	71,854	49,641	I.	44.9
Kentucky Cent.	88,625	72,419	I.	22.3
Net	37,934	14,620	I.	15.9
Mem. & Charles.	111,964	84,853	I.	31.9
Net	57,589	14,190	D.	21.7
Mexican Cen.	351,285	274,764	I.	27.8
Net	126,224	78,712	I.	60.3
N. Y., L. E. & W.	2,096,573	1,887,505	I.	10.9
Net	602,275	554,577	I.	8.7
N. Y. Ont. & W.	130,749	122,486	I.	6.7
Net	21,776	19,892	I.	9.4
Norfolk & West.	334,200	228,127	I.	46.5
Net	123,272	85,404	I.	44.3
Northern Central.	554,404	432,537	I.	28.1
Net	209,519	95,469	I.	114.0
Pennsylvania.	4,911,858	4,336,101	I.	13.2
Net	1,561,439	1,351,133	I.	15.5
Phila. & Erie.	307,583	332,382	D.	8.0
Net	184,394	139,763	I.	32.8
Phila. & Reading.	1,775,912	1,684,957	I.	5.3
Net	927,469	734,090	I.	26.3
Coal & Iron.	1,605,762	1,311,840	I.	18.6
Net	85,233	60,693	I.	40.9
Shenandoah Val.	74,885	60,693	I.	23.3
Net	15,923	11,073	I.	44.0
Union Pacific.	2,506,824	2,224,458	I.	12.6
Net	1,109,098	602,751	I.	8.3
Wabash, East of Miss.	558,850	536,327	I.	4.1
Net	155,048	136,817	I.	13.3
Total (gross).....	\$22,016,013	\$19,463,031		
Total (net).....	7,676,456	5,630,367		

Six months—Jan. 1 to June 30:

Atch., T. & S. F.	9,091,635	6,941,368	I.	21.5
Net	4,200,015	2,942,767	I.	42.9
Balt. & Potomac.	701,300	633,470	I.	10.7
Net	236,647	233,985	I.	1.2
Buff., N. Y. & P.	1,265,542	1,200,637	I.	5.4
Net	186,931	195,683	D.	4.4
Cam. & A. and Br.	243,208	214,529	I.	13.3
Net	6,260	Def. 4,260	I.	10.5
Canadian Pac.	4,728,793	4,100,342	I.	15.6
Net	941,337	1,293,615	D.	27.2
Can. of Georgia.	2,734,324	2,643,513	I.	3.4
Net	744,355	573,691	I.	29.7
Eliz., Lex. & B. S.	483,741	393,476	I.	22.9
Net	144,932	125,659	I.	14.4
Ches., O. & S. W.	825,797	730,268	I.	13.0
Net	294,659	226,945	I.	29.8
Chi., Bur. & Q.	13,276,107	11,523,359	I.	15.2
Net	5,984,983	1,130,843	I.	42.7
Cl., C. & I.	2,030,420	1,810,228	I.	12.2
Net	715,897	576,960	I.	24.0
Den. & R. G. W.	477,203	407,539	I.	16.6
Net	104,538	141,516	D.	26.1
Ft. W. & Den. C.	290,230	170,360	I.	70.3
Net	105,978	69,727	I.	51.4
Gr. Rapids & I.	1,329,774	1,081,210	I.	22.9
Net	418,342	311,742	I.	33.2
Kentucky Cent.	462,440	389,723	I.	18.6
Net	169,413	115,029	I.	47.2
Mem. & Charles.	757,141	595,006	I.	27.2
Net	98,830	135,759	D.	27.1
Mexican Central.	2,318,693	1,843,266	I.	25.7
Net	1,048,614	586,790	I.	78.7
N. Y., L. E. & W.	11,440,309	10,457,049	I.	9.4
Net	3,251,346	2,822,420	I.	14.9
N. Y. Ont. & W.	663,142	588,390	I.	12.7
Net	66,598	30,800	I.	116.2
Norfolk & West.	1,879,784	1,449,389	I.	30.8
Net	729,890	566,096	I.	28.8
Northern Central.	3,081,593	2,582,401	I.	19.3
Net	1,254,836	898,380	I.	39.5
Pennsylvania.	26,370,724	22,350,104	I.	18.0
Net	8,784,383	7,669,624	I.	14.5
Phila. & Erie.	1,864,401	1,667,710	I.	11.8
Net	766,111	709,697	I.	7.9
Phila. & Reading.	10,154,498	8,726,245	I.	16.3
Net	5,186,960	3,279,936	I.	58.1
Coal & Iron Co.	7,646,046	6,433,069	I.	18.8
Net	1,121,751	1,406,923	D.	21.1
Shenandoah Val.	385,523	301,614	I.	26.2
Net	54,465	15,878	I.	242.6
Union Pacific.	13,021,892	11,331,057	I.	14.9
Net	3,682,972	3,553,835	I.	3.1
Wab., E. of Miss.	3,050,731	3,010,298	I.	1.3
Net	945,703	586,355	I.	61.2
Total (gross).....	\$120,603,747	\$104,604,786		
Total (net).....	41,419,946	31,351,981		

Month of April:

Chi. Mil. & St. P.	1,979,661	1,768,896	I.	12.2
Net	646,426	553,265	I.	16.8
Del., L. & W.	1,620,633	1,388,724	I.	16.6
Net	787,227	716,342	I.	9.8
N. Y., L. E. & W.	6,083,650	5,580,738	I.	8.9
Net	1,949,085	1,741,446	I.	11.9

Three months—April 1 to June 30:

Chi. Mil. & St. P.	1,806,403	1,856,847	I.	2.8
Net	227,175	373,385	D.	3.1
Del., L. & W.	1,620,633	1,388,724	I.	16.6
Net	787,227	716,342	I.	9.8
N. Y., L. E. & W.	6,083,650	5,580,738	I.	8.9
Net	1,949,085	1,741,446	I.	11.9

Four months—Jan. 1 to April 30:

Chi. Mil. & St. P.	1,806,403	1,856,847	I.	2.8
Net	227,175	373,385	D.	3.1
Del., L. & W.	1,620,633	1,388,724	I.	16.6
Net	787,227	716,342	I.	9.8
N. Y., L. E. & W.	6,083,650	5,580,738	I.	8.9
Net	1,949,085	1,741,446	I.	11.9

Five months—Jan. 1 to May 31:

Chi. Mil. & St. P.	1,806,403	1,856,847	I.	2.8
Net	227,175	373,385	D.	3.1
Del., L. & W.	1,620,633	1,388,724	I.	16.6
Net	787,227	716,342	I.	9.8
N. Y., L. E. & W.	6,083,650	5,580,738	I.	8.9
Net	1,949,085	1,741,446	I.	11.9

Seven months—Dec. 1 to Jan. 30.

Phil. & Read. R.R.	1886-7.	1885-6.	Inc. or Dec.	P. c.
Net	11,731,210	10,375,120	I.	13.8
Phil. & R.C. & I. Co.	8,855,271	4,010,711	I.	45.9
Net	8,968,571	7,776,326	I.	15.5
Net	263,493	1,197,350	I.	1,460,843

Eight months—Nov. 1 to June 30:

Ft. Worth & D. C.	388,956	247,241	I.	61.3
Net	160,094	84,539	I.	75.5

Nine months—Oct. 1 to June 30:

B. N. Y. & Phil.	1,899,403	1,856,847	I.	2.2
Net	227,175	373,385	D.	4.9
N. Y., Ont. & W.	990,251	1,069,963	D.	7.9
Net	163,102	104,715	D.	1.5

Ten months—Sept. 1 to June 30:

Can. of Ga.	5,449,239	5,310,281	I.	2.6
Net	2,015,948	1,859,831	I.	8.3

Year to May 31:

Chicago & N. W.	29,321,316	24,279,600	I.	20.4
Net	11,250,974	10,420,374	I.	7.9
Fre. Elk. & Mo. V.	2,662,734	1,737,076	I.	5.3
Net	1,309,928	884,018	I.	48.1
Sioux C. & Pacific.	559,803	508,777	I.	10.0
Net	279,033	284,477	D.	1.8

## ANNUAL REPORTS.

## Chicago &amp; Northwestern.

At the close of the twenty-eighth fiscal year, May 31, 1887, this company operated 4,101.35 miles of road, as follows:

Chicago & Northwestern Railway	2,500.50 miles.
Dakota Central Railway	666.23 "
Winona & St. Peter Railway	448.48 "
Toledo & Northwestern Railway	385.19 "
Iowa Railway Coal & Manufacturing Co.	3.25 "
Sycamore, Cortland & Chicago Railroad	4.64 "
Northern Illinois Railway	77.00 "
Princeton & Western Railway	16.06 "

Total on May 31, 1887..... 4,101.35 miles.

The number of miles on May 31, 1886, was..... 3,948.71 "

Increase during the year..... 152.64 miles

The increase is made up of three extensions of the Dakota Central Railway—one of them constructed from Columbia to Oakes, 38.53 miles, one from Redfield to Faulkton, 32.54 miles, and one from Doland to Verdon, 24.88 miles, total, 95.95 miles; by an extension of the Toledo & Northwestern Railway from Lake City to Wall Lake Junction, 15.83 miles; an extension of the Maple Valley Branch from Mapleton to Onawa, 20.70 miles; the construction of the Janesville & Evansville Cut-off Line, 16.10 miles; an extension from Winona Junction to La Crosse, 3.96 miles; and an extension to the Mitchell Iron Mine, in Michigan, of 1.05 miles. These new lines were opened at different periods, and are equal to 88.52 miles operated one year. The total average amount of railroad operated during the entire year, and covered by this report, was 4,037.23 miles.

Of this 4,101 miles, 1,601 is owned through proprietary companies.

## Liabilities.

Stocks, common	\$41,374,869
" preferred	2,325,455
" proprietary lines	674,183
Funded debt	97,384,500
Sinking funds paid	4,320,175
General liabilities	162,000
Operating	6,094,825
Income account, balance	2,594,537
Land income account	714,104
Total liabilities	\$176,048,645

The equipment consists of 735 locomotives, 362 passenger cars of all classes, 12,434 box freight cars, 5,561 stock platform and gondola cars, 3,957 iron ore cars and 842 cars of various sorts.

The general balance sheet condensed is as follows:

## Assets.

Road and equipment	144,161,050
Trustees of sinking funds	4,320,175
General assets, securities owned, etc.	18,594,455
Material	3,000,978
Accounts receivable	1,737,952
Cash	4,214,038
	176,048,646

There was no change in the capital stock, except the issue of three shares of common in place of the same amount of old fractional scrip retired. The company holds \$10,009,701 of common stock and scrip. The capital stock of certain proprietary companies to the amount of \$11,200,500 owned by the Northwestern, have been carried on the general balance sheet at their par value while having but a comparatively nominal value as assets of the company. These stocks have now been entered at their estimated value of \$674,183.32 "with reference to cost" and the stated cost of the properties has been reduced accordingly.

There were issued \$3,147,000 Chicago & Northwestern 4 per cent. "extension bonds of 1886," of which \$5,772,000 was used in the extension of the Fremont, Elkhorn & Missouri Valley and construction of the Wyoming Central. The rest of this issue has been used in extensions of the system as follows: Dakota Central, \$1,425,000; Toledo & Northwestern, \$270,000; Maple Valley, \$360,000; Janesville & Evansville, \$320,000.

Winona & St. Peter 1st mortgage 7s were retired to the amount of \$1,274,000, and the net increase of funded debt was \$6,873,000. The net amount of interest account chargeable to the business of the year was \$5,136,198; being \$400,165 less than the preceding year.

The Land Department reports sales from the Minnesota grant of 23,218 acres at \$6.11 per acre; 42,559 at \$1.90 per acre from the Michigan grant, and 1,333 at \$2.15 from the Wisconsin grant. In addition 182,031 acres were deeded out of the Minnesota grant in settlement of a decree in favor of Barney et al for construction account before 1867. There remain 1,370,894 acres, of which 320,000 are under contract of sale.

The earnings for the year were as follows:

	1886-87	1885-86	Inc. or Dec.	P. c.
Freight.....	19,329,483	17,503,244	I.	1,826,239 10.4
Passenger.....	5,320,151	5,646,150	I.	174,001 3.1
Mail and express.....	869,295	858,220	I.	11,075 1.3
Miscellaneous.....	302,386	271,986	I.	30,400 11.2
Total.....	26,321,315	24,279,600	I.	2,041,714 8.4
Expenses and taxes.....	15,070,342	13,859,226	I.	1,211,116 8.7
Net.....	11,250,973	10,420,374	I.	830,599 7.9
Gross p-r mile.....	6,520	6,239	I.	280 4.5
Net.....	2,787	2,678	I.	109 4.0
Per cent. of expense.....	57.98	57.08	I.	109 4.0
Per cent. of expenses, not including taxes.....	54.55	54.19		